Idiopathic normal pressure hydrocephalus outcome

- Postoperative changes in ventricular cerebrospinal fluid biomarkers with correlation to clinical outcome in idiopathic normal pressure hydrocephalus
- Corrigendum to 'Long-term outcomes after shunt surgery in older patients with idiopathic normal pressure hydrocephalus' [Clin. Neurol. Neurosurg., Vol. 249 (2025) 108783]
- 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
- Value of biomarkers in the prediction of shunt responsivity in patients with normal pressure hydrocephalus
- The Effects of Endoscopic Third Ventriculostomy Versus Ventriculoperitoneal Shunt on Neuropsychological and Motor Performance in Patients with Idiopathic Normal Pressure Hydrocephalus-ENVENTOR-iNPH: Study Protocol
- Prevalence of idiopathic normal pressure hydrocephalus in patients with degenerative cervical myelopathy

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Positive prognostic markers for therapeutic success include Disproportionately Enlarged Subarachnoid Space Hydrocephalus (DESH), short disease duration, predominant gait disturbance, and few comorbidities [1)]

Postoperative

Analysis of the efficacy of shunts for possible iNPH conducted in Japan indicated a significant improvement in the mRS grade between baseline and outcome within 1 year, regardless of the surgical technique, and shunt intervention was found to be effective [2)].

Clinically, patients presenting with early or severe dementia have worse outcome, while those with a primary gait disturbance feature have better results [3) 4)].

Clinical improvement of patients with iNPH can be sustained for 5-7 years in some patients, even if shunt revision surgery is needed multiple times. With earlier diagnosis and treatment and the increasing lifespan of the ageing population, the need for long-term follow-up after shunt surgery may be greater than it was in the past. Monitoring, identification and treatment of shunt obstruction is a key management principle [5)].

Brain imaging

No brain imaging parameters were consistently and repeatedly reported as different between iNPH shunt responders and non-responders [6].

Positive factors

Mild preoperative Idiopathic normal pressure hydrocephalus severity, shorter preoperative symptom duration, good tap test response, and complete disproportionately enlarged subarachnoid space hydrocephalus (DESH) were associated with good short-term postoperative outcome at 1 year. These positive factors may be useful for prediction of short-term surgical outcome in iNPH patients [7]

Comorbid conditions interfere with the ability to assess progression of iNPH and the effectiveness of the shunt. Patient caregivers play a large role in decision-making and clinical course, and should be included when counseling patients [8].

A 2001 meta-analysis of outcomes reported the Idiopathic normal pressure hydrocephalus treatment to have a 29% rate of significant improvement and a 6% significant complication rate [9].

A study in 2005 revealed greater improvements, with 75% of patients (n = 132) seeing postoperative improvements within 24 months of surgery [10], 68% of patients experiencing “very good” or “good” outcomes in a prospective study [11], and 69%–84% of patients seeing improvements by 1 year after surgery in a prospective multicenter study [12].

Studies that have established fixed protocols for follow-up have shown that short- and long-term periods after shunting are determined by many factors. Whereas short-term results were more likely to be influenced by shunt-associated risks, long-term results were independent of factors inherent to the shunt procedure and shunt complications, i.e., death and morbidity related to concomitant cerebrovascular and vascular diseases [13].

In 2013 a total of 64 studies of 3,063 patients were reviewed. Positive improvement following shunt insertion was reported in an average of 71 % of patients with an average 1 % mortality. Results from studies published in the last 5 years showed 82 % improvement following shunt insertion, mortality of 0.2 %, and combined common complications rate of 8.2 % [14].

Gait and Incontinence

Postoperative improvement of Gait and Urinary incontinence is obtained at an early stage [15] [16]. In contrast, Dementia tends to improve gradually from after the third postoperative month. The family satisfaction increases as the symptom of Dementia improve. The satisfaction of the medical personnel tends to remain high after the first postoperative month [17].

Independent predictors

Independent predictors of improvement are the presence of gait impairment as the dominant symptom and shorter duration of symptoms [18].

Caregiver Burden

see Caregiver burden in idiopathic normal pressure hydrocephalus.

References

1)
Illies T, Eckert B, Kehler U. What Radiologists Should Know About Normal Pressure Hydrocephalus. Rofo. 2021 Oct;193(10):1197-1206. English, German. doi: 10.1055/a-1425-8065. Epub 2021 Sep 16. PMID: 34530457.
2)
Nakajima M, Miyajima M, Ogino I, Akiba C, Kawamura K, Kurosawa M, Kuriyama N, Watanabe Y, Fukushima W, Mori E, Kato T, Sugano H, Karagiozov K, Arai H. Shunt Intervention for Possible Idiopathic Normal Pressure Hydrocephalus Improves Patient Outcomes: A Nationwide Hospital-Based Survey in Japan. Front Neurol. 2018 Jun 7;9:421. doi: 10.3389/fneur.2018.00421. eCollection 2018. PubMed PMID: 29942280; PubMed Central PMCID: PMC6004916.
3)
Bugalho P, Alves L, Ribeiro O. Normal pressure hydrocephalus: a qualitative study on outcome. Arq Neuropsiquiatr. 2013 Nov;71(11):890-5. doi: 10.1590/0004-282×20130173. PubMed PMID: 24394877.
4)
Poca MA, Mataró M, Matarín M, Arikan F, Junqué C, Sahuquillo J. Good outcome in patients with normal-pressure hydrocephalus and factors indicating poor prognosis. J Neurosurg. 2005 Sep;103(3):455-63. PubMed PMID: 16235677.
5)
Pujari S, Kharkar S, Metellus P, Shuck J, Williams MA, Rigamonti D. Normal pressure hydrocephalus: long-term outcome after shunt surgery. J Neurol Neurosurg Psychiatry. 2008 Nov;79(11):1282-6. doi: 10.1136/jnnp.2007.123620. Epub 2008 Mar 20. PubMed PMID: 18356257.
6)
Carlsen JF, Munch TN, Hansen AE, Hasselbalch SG, Rykkje AM. Can preoperative brain imaging features predict shunt response in idiopathic normal pressure hydrocephalus? A PRISMA review. Neuroradiology. 2022 Jul 24. doi: 10.1007/s00234-022-03021-9. Epub ahead of print. PMID: 35871239.
7)
Kimura T, Yamada S, Sugimura T, Seki T, Miyano M, Fukuda S, Takeuchi M, Miyata S, Tucker A, Fujita T, Hashizume A, Izumi N, Kawasaki K, Nakagaki A, Sako K. Preoperative Predictive Factors of Short-Term Outcome in Idiopathic Normal Pressure Hydrocephalus (iNPH). World Neurosurg. 2021 Apr 22:S1878-8750(21)00596-9. doi: 10.1016/j.wneu.2021.04.055. Epub ahead of print. PMID: 33895373.
8)
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.
9)
Hebb AO, Cusimano MD: Idiopathic normal pressure hydrocephalus: a systematic review of diagnosis and outcome. Neurosurgery 49:1166–1186, 2001

10) 18)
,
McGirt MJ, Woodworth G, Coon AL, Thomas G, Williams MA, Rigamonti D. Diagnosis, treatment, and analysis of long-term outcomes in idiopathic normal-pressure hydrocephalus. Neurosurgery. 2005 Oct;57(4):699-705; discussion 699-705. PubMed PMID: 16239882.
11)
Meier U, Kiefer M, Neumann U, Lemcke J: On the optimal opening pressure of hydrostatic valves in cases of idiopathic normal-pressure hydrocephalus: a prospective randomized study with 123 patients. Acta Neurochir Suppl 96:358–363, 2006
12)
Wikkelsø C, Hellström P, Klinge PM, Tans JT: The European iNPH Multicentre Study on the predictive values of resistance to CSF outflow and the CSF Tap Test in patients with idiopathic normal pressure hydrocephalus. J Neurol Neurosurg Psychiatry 84:562–568, 2013
13)
Klinge P, Marmarou A, Bergsneider M, Relkin N, Black PM. Outcome of shunting in idiopathic normal-pressure hydrocephalus and the value of outcome assessment in shunted patients. Neurosurgery. 2005 Sep;57(3 Suppl):S40-52; discussion ii-v. Review. PubMed PMID: 16160428.
14)
Toma AK, Papadopoulos MC, Stapleton S, Kitchen ND, Watkins LD. Systematic review of the outcome of shunt surgery in idiopathic normal-pressure hydrocephalus. Acta Neurochir (Wien). 2013 Oct;155(10):1977-80. doi: 10.1007/s00701-013-1835-5. Epub 2013 Aug 23. Review. PubMed PMID: 23975646.
15)
Savolainen S, Hurskainen H, Paljärvi L, Alafuzoff I, Vapalahti M: Five-year outcome of normal pressure hydrocephalus with or without a shunt: predictive value of the clinical signs, neuropsychological evaluation and infusion test. Acta Neurochir (Wien) 144:515–523, 2002
16) 17)
,
Takeuchi T, Goto H, Izaki K, Tamura S, Sasanuma Z, Maeno K, Kikuchi Y, Tomii M, Koizumi Z, Watanabe Z, Numazawa S, Ito Y, Ohara H, Kowada M, Watanabe K. Postoperative patterns of improvement of symptoms and degrees of satisfaction in families of patients after operations for definite idiopathic normal pressure hydrocephalus: a long-term follow-up study]. No Shinkei Geka. 2007 Aug;35(8):773-9. Japanese. PubMed PMID: 17695775.