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Predictors of Cerebrospinal Fluid Shunt Success in Idiopathic Normal Pressure Hydrocephalus: A Systematic Review

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Idiopathic normal pressure hydrocephalus (NPH) is the most common type of adult hydrocephalus. Gait, cognitive and urinary disturbances are the most commonly presenting symptoms however, definitive diagnosis is not possible solely based on the clinical picture and according to guidelines definitive diagnosis can only be established retrospectively after a positive response to ventriculoperitoneal shunt surgery (VPS) is achieved. We aim to summarize current evidence of the predictive value of reported parameters for cerebrospinal fluid (CSF) shunting success in patients with NPH.

Methods: We conducted a systematic review of literature in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. We searched the PubMed database for articles published until February 2024 using the following search algorithm: ((((((shunt, ventriculoperitoneal[MeSH Terms]) OR (ventriculo gall bladder shunt)) OR (ventriculoatrial shunt)) OR (ventriculopleural shunt)) OR (thecoperitoneal shunt)) OR (lumboperitoneal shunt))) AND (hydrocephalus, normal pressure[MeSH Terms]) Filters: English, Humans. We included studies reporting clinical or radiological outcomes of CSF shunting for NPH. We excluded secondary NPH, studies in any language other than English, non-clinical studies, non-primary research, and case reports. Two independent reviewers assessed each abstract and all included abstracts for eligibility. Any disagreement was resolved by consensus of both reviewers. Relevant data was extracted into a pretested master table based on current literature.

Results: 475 abstracts were screened, and 253 were reviewed in full text. 122 studies of 9131 patients were included in our analysis after full text review. VPS was performed more commonly than lumboperitoneal shunting mostly using programmable valves. Gait was the most common symptom assessed pre- and postoperatively, followed by cognition and incontinence, respectively. The callosal angle was the most investigated radiological sign investigated preoperatively other than ventriculomegaly. Postoperative follow-up ranged from 1 week to >5 years. 5542 patients showed improvement after shunting.

Conclusions: VPS is an effective treatment for NPH. Gait disturbances are commonly reported in NPH and might be a reliable clinical indicator for VPS success. However, further investigation is necessary.

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Fluorescein Guided Surgical Treatment of D7-D8 CSF-Venous Fistula: Case Report and Literature Review

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Oral e-Poster Presentations - Booth 4: Adult CSF 2, October 16, 2024, 4:40 PM - 5:20 PM

Background: An anomalous outflow of cerebrospinal flow (CSF) from spinal subdural periradicular space to veins of internal or external vertebral plexus, or basivertebral plexus is hypothesized as the pathogenic mechanism of CSF-Venous Fistula (CVF). It is a rare cause of spontaneous intracranial hypotension (SIH) and very difficult to detect.

Methods: The authors reported a case of CVF and a narrative non-systematic review with a specific analysis on the use of intraoperative fluorescein.

Results: since 2011, 111 surgical approaches were reported, but with intrathecal fluorescein in only 4 patients. Following diagnosis of bilateral thin (3mm)

hygroma and thrombosis of Superior Sagittal Sinus and left Trolard Vein at Angio-CT scan and angio-MRI, a 58 years-old man was investigated with serial cranial CT scans, due to the persistent 3-months history with olocranic headache, nausea and vomiting. Due to a fluctuating postural aspect of symptoms, in the suspicion of SIH, a spinal MRI was performed, but no CSF leak was identified. Because of persisting symptoms, a spinal myelography disclosed a D7-D8 right CVF.

The patient underwent, a minimal invasive right D7-D8 foraminotomy, through a paramedian skin incision. A 4 ml of solution of fluorescein and ringer lactate (10%) was intrathecally injected through a percutaneous lumbar catheter. A filling of D8 nerve root and of two paravertebral fistulous veins was observed 2 minutes after injection. Thus, the coagulation of the anomalous communication has been optic guided by fluorescein uptake. Patient had immediate post-operative complete regression of symptoms. Radiological findings confirmed the treatment.

Conclusions: CVF should be considered a cause of SIH, when no other causes are detected on basic neuroradiological workout, especially with persistent symptoms. Myelography is the key for the diagnosis. Intrathecal intraoperative fluorescein allows the visualization of the CVF, the proper coagulation of the draining vein and the confirmation of the CVF occlusion.

Optional Image

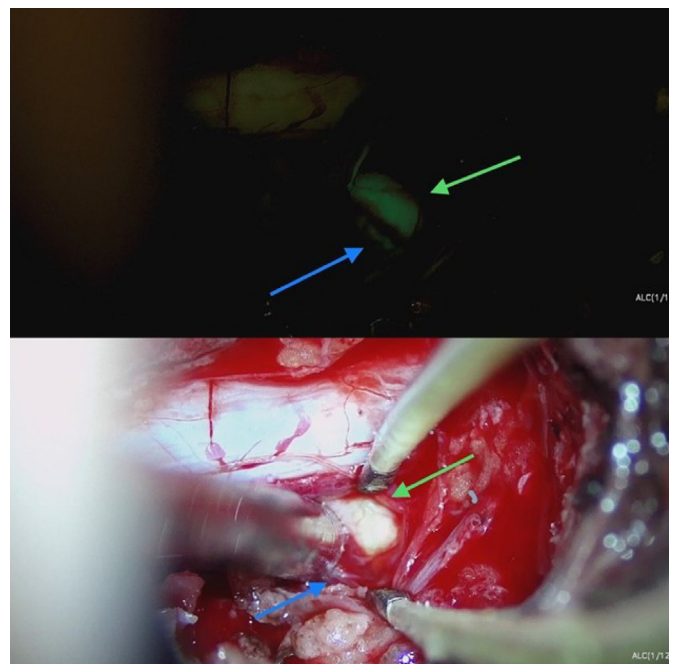


Figure 1: Right D8 spinal root (green arrows) and one of the radicular fistulous vein (blue arrow). Correlation between intra-operative fluorescein filter and normal vision.

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Prospective investigation of the relationship between preoperative melatonin levels and typical symptoms in patients with pineal cysts

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Oral e-Poster Presentations - Booth 4: Adult CSF 2, October 16, 2024, 4:40 PM - 5:20 PM

Background: Melatonin (ML) is synthesized in the pineal gland and is subject to a circadian rhythm. Patients with symptomatic pineal cysts (PC) - who do not have hydrocephalus - suffer from a variety of symptoms in addition to cephalgias and sleep disorders. However, the pathomechanism is still unclear - a disturbed ML secretion is being discussed. However, the data regarding melatonin levels in patients with PC is still insufficient.

Methods: As part of a prospective study in patients with symptomatic PC, we examined the preoperative ML level in the saliva in a half-hour rhythm between 08:30 p.m. and 01:00 a.m.. In addition, symptoms, in particular sleep quality and pain, were recorded over a week with the help of a diary. We analyzed the relationship between symptoms and the ML level using Spearman's correlation and the deviation of the melatonin level from the normal values using a Wilcoxon test.

Results: A total of eight female patients have been included so far. The average age was 36.3 years. The average size of the PC was 12.3 mm. The patients had been suffering from symptoms for an average of 3.2 years. They were able to sleep on 2.7 out of 7 days, problems falling asleep occurred on 3.6 out of 7 days. Headaches occurred on an average of 5.6 out of 7 days. Four of the 8 patients suffered from continuous headaches. The severity of the headaches was on average 3 to 7 on the VAS. 50% of the patients (n=4) reported nausea. Visual disturbances and fatigue were only present in 25% (n=2) of the patients. There was no significant correlation between the size of the PC and the ML level. The ML level at 8:30 p.m. correlated significantly with problems sleeping through the night (p= 0.006). There was no significant correlation between ML level and the other symptoms recorded. However, the ML values deviated significantly from the reference values, particularly due to a lack of increase in ML concentration during the night. While three patients were still within the normal range at 8:30 p.m., from 10:00 p.m. only one was, and from 00:30 a.m. all patients were below the normal range. The deviation from the reference values was statistically significant for the measurements at 8:30 p.m. (p=0.0469), 09:30 p.m. (p= 0.0078), 10:00 p.m. (p=0.0078), 10:30 p.m. (p= 0.0156), 00:30 a.m. (p= 0.047) and 01:00 a.m. (p= 0.047).

Conclusions: The ML level in patients with symptomatic PC deviates significantly from normal ML levels. In particular, a lack of increase at night can be observed, which may provide an explanation for the symptoms. The lack of correlation with symptoms in our group can be attributed to the fact that no symptom-free comparison group was analyzed.

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Cognitive Reserve Index questionnaire – Prognostic relevance in neurosurgery

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Oral e-Poster Presentations - Booth 3: Neuro-Oncology 9 (GBM & malignant gliomas), October 16, 2024, 4:40 PM - 5:20 PM

Background: The Cognitive Reserve Index Questionnaire (CRIq) is a validated tool that measures cognitive reserve, reflecting the brain's resilience to neuropathological damage and its compensatory mechanisms. This study aims to conduct a comprehensive analysis of variations in CRIq scores and the underlying factors among diverse neuro-oncological and neuro-vascular diseases.

Methods: In this pilot series, all patients attending our neuro-oncology outpatient clinic over a 7-month period (October 2022 to April 2023) and patients with subarachnoid hemorrhage (SAH) between April and October 2023 were requested to complete the CRIq questionnaire. Data analysis adhered to the established "Instructions for the administration of the CRIq" (Nucci et al., 2012) and was correlated with epidemiological data. Patients were categorized by age, marital and parental status, tumor malignancy, WHO Grading System, Hunt and Hess Scale, treatment modality, and tumor/SAB/aneurysm localization. Statistical analyses were performed using Prism for Windows 10 (Version 8.4.2, GraphPad Prism).

Results: Neuro-oncology: The study encompassed a cohort of 173 neuro-oncological patients. Among them, 105 individuals (60.7%) fully completed the CRIq questionnaire, allowing for CRI calculation. CRI scores were distributed as follows: 0.95% low, 2.85% medium-low, 67.62% medium, 19.04% medium-high, and 9.52% high (as defined by Nucci et al.). Age and parental status had a statistically significant impact on CRI, while gender did not. Interestingly, a significant increase in CRI scores was observed in highly malignant diseases such as glioblastoma (mean CRI score of 116.63 ± 13.18) compared to less malignant ones like low-grade gliomas (mean CRI score of 99.57 ± 8.18) (two-tailed p-value of 0.0063, Mann-Whitney test).

SAH: Our participant cohort comprises 32 individuals diagnosed with SAH between April and December 2023. Among them, 5 refused to participate, and 10 individuals were omitted, leaving us with our cohort of 17 patients. We found no

statistical significance between different treatment modalities (namely incidental SAHs with or without treatment and SAHs with or without aneurysms) or gender. We observed an upward tendency in adult and elderly patients, though without statistical significance. There was a statistically significant increase in cognitive reserve in patients with children in both populations alike (p = 0.0178, two-tailed t-test).

Conclusions: Neuro-oncology: The study encompassed a cohort of 173 neuro-oncological patients. Among them, 105 individuals (60.7%) fully completed the CRIq questionnaire, allowing for CRI calculation. CRI scores were distributed as follows: 0.95% low, 2.85% medium-low, 67.62% medium, 19.04% medium-high, and 9.52% high (as defined by Nucci et al.). Age and parental status had a statistically significant impact on CRI, while gender did not. Interestingly, a significant increase in CRI scores was observed in highly malignant diseases such as glioblastoma (mean CRI score of 116.63 ± 13.18) compared to less malignant ones like low-grade gliomas (mean CRI score of 99.57 ± 8.18) (two-tailed p-value of 0.0063, Mann-Whitney test).

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INDIGO: A global, randomized, double-blinded, phase 3 study of vorasidenib versus placebo in patients with residual or recurrent grade 2 glioma with an IDH1/2 mutation

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Molecular neuro-oncology - from basic research to clinical applications (Neuro-Oncology Parallel Session), Hall 07, October 14, 2024, 8:00 AM - 9:30 AM
Mutations in isocitrate dehydrogenase 1/2 are known oncogenic drivers. In brain tissue, these mutations lead to the development of a slow progressive, malignant brain cancer; mIDH1/2 glioma. Current treatments for mIDH1/2 glioma – surgery followed by radiation/chemotherapy – are not curative and are associated