

EPIDEMIOLOGY OF NORMAL PRESSURE HYDROCEPHALUS

PREVALENCE, RISK FACTORS, DIAGNOSIS AND PROGNOSIS

Akademisk avhandling som för avläggande av medicine doktorsexamen vid
Göteborgs Universitet kommer att offentligens försvaras i hörsal Ivan
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Av
Daniel Jaraj

Fakultetsopponent
Professor Neill R. Graff-Radford
Department of Neurology, Mayo Clinic, Jacksonville FL, USA

Avhandlingen baseras på följande delarbeten:

- I. D Jaraj, K Rabiei, T Marlow, C Jensen, I Skoog, C Wikkelsø. Prevalence of Idiopathic Normal-Pressure Hydrocephalus. *Neurology* 2014; 82:1449-1454. © American Academy of Neurology
- II. D Jaraj, S Agerskov, K Rabiei, T Marlow, C Jensen, X Guo, S Kern, C Wikkelsø, I Skoog. Vascular Factors in Suspected Normal-Pressure Hydrocephalus: A Population-based Study. *Neurology* 2016; 86:592-9. © American Academy of Neurology
- III. D Jaraj, K Rabiei, T Marlow, C Jensen, I Skoog, C Wikkelsø. Estimated Ventricle Size Using Evans Index In a Population-based Sample. Manuscript.
- IV. D Jaraj, C Wikkelsø, K Rabiei, T Marlow, C Jensen, S Östling, I Skoog. Mortality and Risk of Dementia in Normal-Pressure Hydrocephalus: A Population Study Submitted.



UNIVERSITY OF GOTHENBURG

Sahlgrenska Akademien
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ABSTRACT

The number of older persons and individuals with cognitive impairment is expected to increase dramatically in most parts of the world. It is therefore important to learn more about disorders that affect cognition. Idiopathic normal pressure hydrocephalus (iNPH) mainly occurs in older persons and symptoms include cognitive impairment, gait disturbance and urinary symptoms. The aim of this thesis was to examine various aspects regarding the epidemiology of iNPH.

The sample comprised data from the Gothenburg population studies. Study participants underwent comprehensive clinical and neuropsychiatric examinations between 1986 and 2009. iNPH was diagnosed in concordance with criteria from international consensus guidelines.

Study I: The prevalence of iNPH was higher than previously reported. More than one in twenty, among 80-year-olds, had signs and symptoms consistent with probable iNPH. *Study II:* Vascular risk factors and markers of cerebrovascular disease were associated with iNPH. Hypertension was related to an almost three-fold increased chance of having imaging signs of iNPH. For diabetes, it was more than four-fold. The strongest relation to iNPH was for cerebral white matter lesions, which were associated with a more than six-fold increased chance. *Study III:* More than one fifth of the sample had ventricular enlargement, defined by current cut-off values for Evans Index. In addition, men aged 80 years or more, had on average, values equal to or higher than what is currently considered pathological. *Study IV:* Persons who fulfilled criteria for probable iNPH had an almost four-fold increased risk of death. In those with radiological signs of iNPH, the risk of dementia was almost three-fold increased.

iNPH is probably more common than previously supposed. Many older persons have clinical and imaging signs consistent with iNPH. These findings are important considering that iNPH is a treatable disorder. Vascular factors are probably involved in the pathophysiology. Current cut-off values for ventricular enlargement, using Evans Index, ought to be reappraised in order to improve diagnostic possibilities. Untreated iNPH is associated with a poor prognosis with a high risk of death or dementia. Radiological signs of iNPH may have a greater prognostic importance than previously presumed.

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