

Is Idiopathic Normal Pressure Hydrocephalus Underdiagnosed by Radiologists? A Retrospective Chart Review

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Introduction

- Idiopathic Normal Pressure Hydrocephalus (iNPH) is the only treatable cause of dementia.
- Treatment is with ventriculoperitoneal shunting.
- Outcomes are improved with earlier intervention ¹.
- Imaging findings can appear years before clinical symptoms ².
- Diagnosis requires radiographic findings, clinical findings, and normal opening pressure on lumbar puncture.
- Large volume lumbar puncture (LVLP) is used to support diagnosis + predict shunt responsiveness.
- Prevalence estimates range from ~1.5% in those >65, ~8% in those >80, and ~11% in assisted living populations ^{3,4}.

Purpose

- To assess whether radiologists are under-diagnosing iNPH on neuroimaging.
- To examine referral patterns of patients being worked up for iNPH to determine where quality improvement efforts could be directed.

Methods

EMR was queried to generate a list of all patients who underwent LVLP ordered by our iNPH specialist neurosurgeon in the previous 5 years

Must have Possible or Probable iNPH diagnosis and no prior neurological procedures ⁵

Examined all neurological imaging prior to that point for imaging findings suggestive of iNPH

Additional data recorded:

- imaging modality
- indication for study
- radiologist subspecialty
- time prior to iNPH suggestion
- ordering provider specialty
- which specialty first suggested iNPH as a diagnosis
- who referred the patient to the NPH clinic

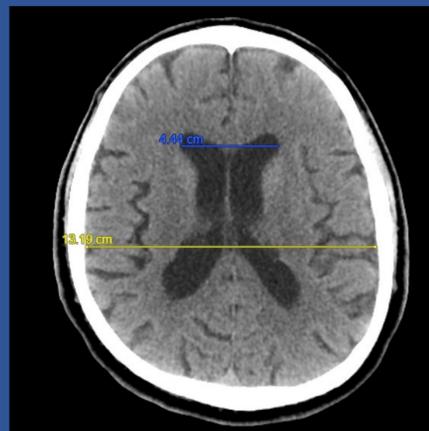


Figure 1. Evan's Index (EI): Ratio between maximal width of frontal horns (blue) to maximal width of inner skull at the same level (yellow). Ratio > 0.3 suggestive of ventriculomegaly

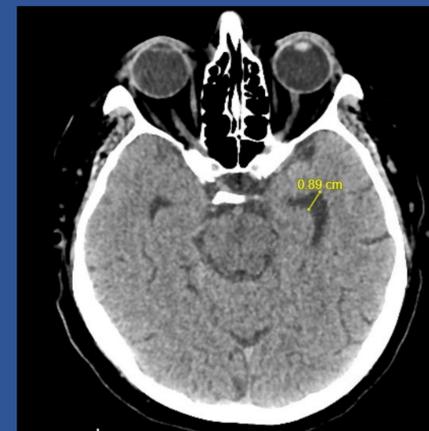


Figure 2. Average temporal horn width >4mm has been shown to be highly sensitive and somewhat specific for NPH symptoms. A cutoff >6mm has low sensitivity but high specificity⁶.

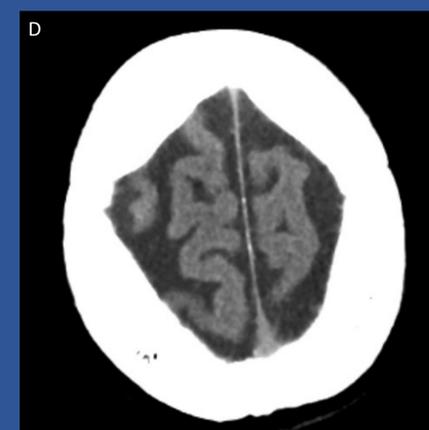
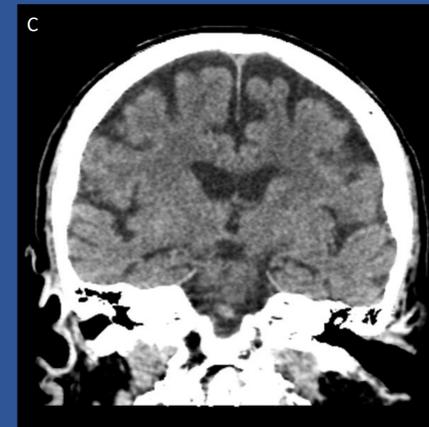
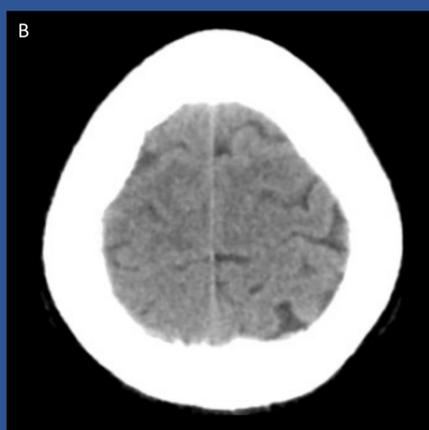
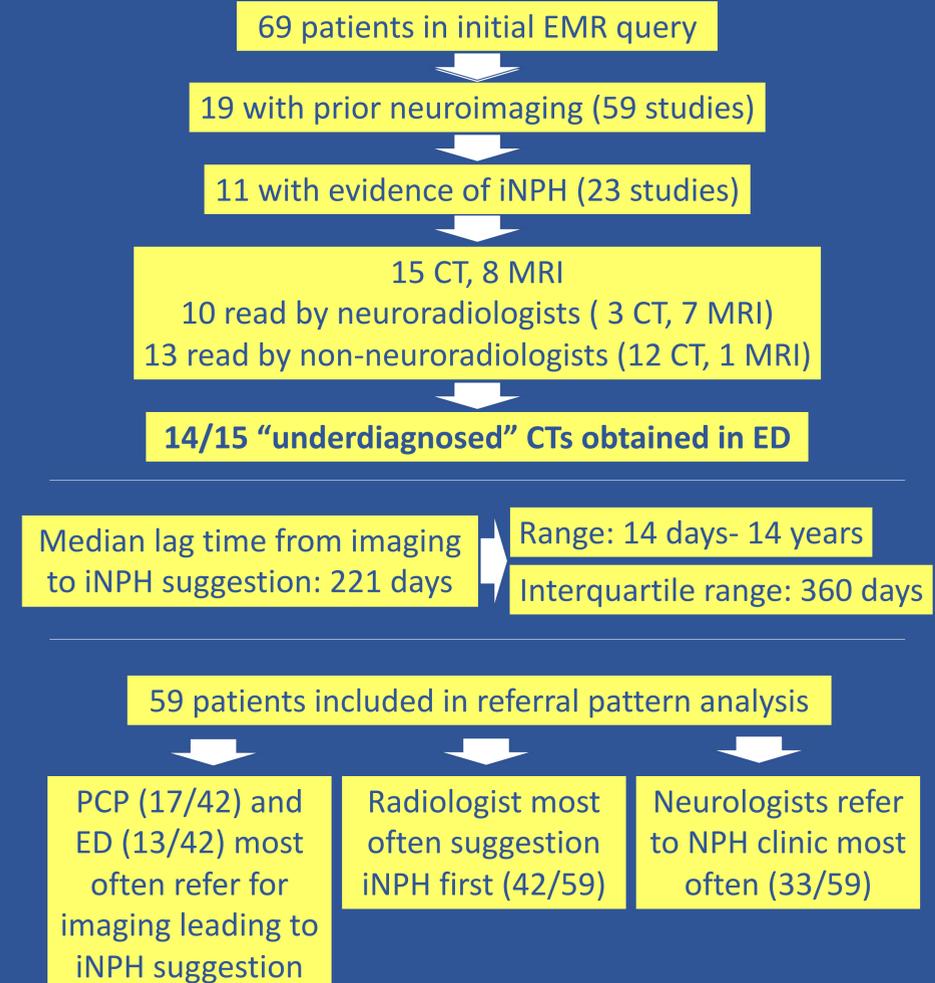


Figure 3. (A): Coronal view demonstrating features of iNPH: crowding of sulci at midline vertex with relative enlargement of sylvia fissures (DESH), callosal angle <90°, periventricular white matter changes. (B) Superior sagittal slice demonstrating crowding of sulci at high convexity. As accurate as coronal view ⁷. (C&D): Normal control demonstrating age-related atrophy

Results



Discussion

- iNPH possible underdiagnosed by radiologists, especially in emergency department setting.
- Treatment and diagnosis of iNPH involves multiple specialties.
- What threshold should radiologists have for suggesting NPH?
- QI efforts should focus on provider education.

Citations

1. (McGirt, 2005) (Kazui, 2013) (Torsnes, 2014)
2. (Iseki, 2008) (Suehiro, 2019)
3. (Martin-Laez, 2002)
4. (Nakajima, 2021)
5. (Relkin, 2005) (Marmarou, 2005)
6. (Kockum, 2018)
7. (Sasaki, 2008)