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.
- Imaging findings can appear years before clinical symptoms.
- Diagnosis requires radiographic findings, clinical findings, and normal opening pressure on lumbar puncture.
- Large volume lumbar puncture (LVLP) is used to support diagnosis and predict shunt responsiveness.
- Prevalence estimates range from ~1.5% in those >65, ~8% in those >80, and ~11% in assisted living populations.

**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.
- 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.

**Results**
- 69 patients in initial EMR query
- 19 with prior neuroimaging (59 studies)
- 11 with evidence of iNPH (23 studies)
- 15 CT, 8 MRI
  - 10 read by neuroradiologists (3 CT, 7 MRI)
  - 13 read by non-neuroradiologists (12 CT, 1 MRI)
- 14/15 “underdiagnosed” CTs obtained in ED
  - Median lag time from imaging to iNPH suggestion: 221 days
  - Range: 14 days - 14 years
  - Interquartile range: 360 days
  - 59 patients included in referral pattern analysis

**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**
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