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## CLINICAL VIGNETTE

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# Normal Pressure Hydrocephalus Presenting as Forgetfulness and Frequent Falls

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A 71-year-old female with hypertension, GERD, and major depression presents for medication refill and complaints of feeling fatigued for the last 5-6 months as well as memory loss and forgetfulness. Her husband reports that he has to remind her of her doctors' appointments four times in one day for example, whereas before she was always very good at managing her appointments herself. She normally uses a cane to assist with balance, but recently she has been having more gait imbalance and husband reports that she has fallen 4-5 times in the last year. She denies any provocation including dizziness. However, she reports losing her balance without any awareness. She has fallen in the driveway, in her bathroom and in public bathrooms. Her biggest fear is walking downhill as she feels that really "throws her off." The vision in right eye has also been declining. Her left eye was removed due to severe glaucoma. She denies word finding difficulty, but sometimes cannot understand what is being said in a conversation or when she is asked something.

She has major depressive disorder and takes duloxetine and doxepin for sleep and depression. She is followed regularly by her psychiatrist. Notable past medical history includes psychiatric hospitalization after overdose attempt with acetaminophen. She had electroconvulsive therapy 10 years prior and her mood is currently stable. On exam she was alert and cooperative. Vital signs: BP 118/87 | Pulse 89 | Temp 36.7 °C (98 °F). Neurologic exam: cranial nerves II – XII within normal limits; Visual fields (confrontation): mildly impaired on the left lateral aspect, Finger to nose: unsteady, but able to perform slowly. No tumor or rigidity: MSK: weak quadriceps strength, wide based gait unable to perform semi-tandem stance, gait unsteady requiring the use of walker. MMSE score 18/30, MOCA declined testing after she became frustrated with MMSE.

She was referred for MRI brain imaging, which showed 1. Moderate to severe diffuse cerebral and cerebellar volume loss with ex vacuo dilatation of the lateral ventricles, raising concern for normal pressure hydrocephalus. Neurosurgery was consulted and performed large volume lumbar puncture under fluoroscopic guidance. She was noted to have significant improvement of symptoms. Subsequently VP shunt was placed. She was discharged to skilled nursing facility for rehabilitation, and subsequently discharged home.

### Discussion

Normal-pressure hydrocephalus (NPH) is characterized by gait disturbance, urinary incontinence, dementia, enlarged brain ventricles, and normal or slightly elevated cerebrospinal fluid pressure.<sup>1</sup> It is thought to result from a defect in CSF resorption in arachnoid granulations. This disorder may account for up to 6% of dementias. Dementia may not occur until late in the disorder. The most common early dementia symptoms are disturbances of executive function and attention; with later memory impairment. Urinary incontinence is common. Gait disturbance in normal-pressure hydrocephalus is usually nonspecific unsteadiness and impaired balance, although magnetic gait (the feet appear to stick to the floor) is considered the characteristic gait disturbance.

Diagnosis of NPH is made with clinical evaluation, neuroimaging, and diagnostic removal of CSF. Lumbar puncture and removal of 30 – 50 mL of CSF can be a diagnostic trial to help confirm diagnosis. CSF opening pressure should be normal in patients with NPH. Improvement in gait, continence, and cognition after removal suggests patients may be good candidates for ventriculoperitoneal (VP) shunt surgery, if surgical risks are acceptable.

This patient underwent lumbar puncture with fluoroscopic guidance with successful removal of 30mL of CSF. She had significant improvement of symptoms immediately post lumbar puncture, and had VP shunt placed. Two weeks after VP shunt placement she noted confirmed improvement of balance and gait. She then noticed a lump developing underneath the abdominal VP shunt incision. She was seen by her neurosurgeon who determined that the shunt catheter had migrated outside of the peritoneum and coiled into a pseudo-pocket. She was taken to the OR for shunt revision without further complications. Since then her memory improved back to baseline, with steady recovery of her balance and gait. She has continued to see her psychiatrist, who is managing her antidepressants with stable mood. She continues to use a walker for ambulation, with fatigue and deconditioning.

### REFERENCES

1. **Huang J.** Normal-Pressure Hydrocephalus. (Merck) MSD Manual Professional Version. [Internet] Available at: <https://www.msdmanuals.com/pt/professional/neurologic-disorders/delirium-and-dementia/normal%20%80%93pressure-hydrocephalus>.