

## Normal-pressure hydrocephalus produces Alzheimer-like symptoms, but is treatable

Easily mistaken for Alzheimer's disease, Parkinson's disease or age-related senility in general is the condition known as normal-pressure hydrocephalus (NPH).

NPH occurs when an accumulation of cerebrospinal fluid (CSF) causes an increase in intracranial pressure.

Recent population-based studies have estimated that NPH each year develops in approximately 5.5 out of every 100,000 people over the age of 65. This relatively small rate of occurrence is nonetheless significant because it implies that at least some patients confined to nursing homes may not need to be there owing to the fact that they do not actually suffer from Alzheimer's disease but, rather, from undiagnosed NPH – a condition that usually is treatable.

If appropriately treated, the NPH symptoms usually most improved are those of gait, dementia and urinary incontinence. The ability to walk with surer footing and function with a less clouded mind are both important from the standpoint of reducing the risk of fall injury, which is, of course, a major concern for the elderly. (Approximately 3% to 6% of falls in old age result in a fracture of the pelvis, arm, rib or face, according to findings.)

### Triad of symptoms

NPH manifests in two varieties.

The first is a form that arises due to sub-arachnoid hemorrhage, head injury, cranial surgery or central nervous system infection.

More prevalent is the second form of NPH, which is of an idiopathic nature. Its cause and exact mechanism of

pathology are at present unknown; however, it is regarded to be a type of communicating hydrocephalus involving impaired CSF resorption at the arachnoid villi. Characteristic is enlargement of the ventricles and a resultant strain placed upon the surrounding lumbosacral motor fibers. In this situation, the CSF pressure rises but is offset by gradually falling intracranial pressure. Eventually, the CSF pressure becomes steady at a level of approximately 150 to 200 mmH<sub>2</sub>O, which is at the high end of the normal range.

The classic signs of increased intracranial pressure include headache, nausea, vomiting or altered consciousness, but none of these is typically seen in NPH patients. Instead, they experience (and present with) the aforementioned triad of symptoms: gait difficulties, mental decline and urinary incontinence.

With NPH, though, gait disturbance is often progressive due to the expansion of the ventricular system, particularly at the level of the lateral ventricles, and this in turn leads to traction on the surrounding fibers. As a result, patients commonly experience unsteadiness and impaired balance, especially on stairs and curbs. Further, their gait may mimic that which is typical of Parkinson's disease – short, shuffling steps and stooped, forward-leaning posture. Weakness and tiredness may also manifest.

As to dementia, here it is predominantly frontal-lobe in nature. Memory problems are thus usually the main problem, and it is this that can lead to the misdiagnosis of Alzheimer's disease. Other symptoms spun from the frontal-lobe deficiency

include apathy, inattention and poor reasoning ability.

Urinary incontinence appears late in the illness, consisting of increased frequency and urgency. Ultimately, patients may exhibit “frontal lobe incontinence,” where they become indifferent to their recurrent urinary symptoms.

### Test as soon as possible

Today, when patients present with this symptom triad, it is advised that they be scheduled as soon as possible for a CT or MRI examination of the brain to assess the ventricles for appropriateness of size and for CSF flow dynamics. CT scans are useful in that they can reveal the ventricular enlargement. MRI studies are of value because they can demonstrate at least some degree of transependymal migration of CSF surrounding the ventricles on the T2/FLAIR sequence.

One of the most determinative tests available for diagnosing NPH is a lumbar puncture. This relatively simple procedure involves extraction of at least 30 mL of CSF from the lumbar spine. If NPH is present, the patient's gait will temporarily show noticeable improvement about an hour later.

The clinical improvement seen with a lumbar puncture test also has predictive value – chiefly, it will suggest whether the patient is likely a good candidate for treatment with a surgically implanted ventriculoperitoneal shunt.

Ventriculoperitoneal shunts are employed to drain excess CSF and discharge it into the abdomen where it can then be absorbed. With one of these shunts in place, the ventricles

usually reduce in size after about three or four days. A 2004 study concluded that idiopathic NPH patients, if correctly identified as candidates for the procedure, will in most instances be helped. Specifically, the researchers found that 86% of patients experienced improvements in either gait or continence or both.

Significantly, ventriculoperitoneal shunting is a moderately conservative and straightforward intervention. There are at present two types of shunt available for this purpose. One is a simple mechanical valve device with more or less a single, permanent CSF flow setting. The other is a high-tech programmable valve to permit fine postoperative adjustments to the CSF flow as warranted by symptom improvements.

There is no hard-and-fast upper age limit with regard to the viability of candidates for this procedure. As long as the patient is generally deemed operable, this surgery remains an option. Studies suggest that the shunt has a longevity of one or more decades.

### Conclusions

Older adults are more prone to NPH.

NPH is sometimes misdiagnosed as Alzheimer's disease, Parkinson's disease or senility. The reason for this is that it is of a chronic nature and patients typically present with a classic triad of Alzheimer's/ Parkinson's symptoms: gait ataxia, urinary incontinence and dementia.

CT and MRI scans can greatly aid in the diagnosis of NPH by characterizing enlargement of the ventricles despite the presence of normal-range fluid pressure. More definitive is a lumbar puncture test.

NPH symptoms can be reduced with surgical placement of a ventriculoperitoneal shunt in appropriate candidates. This reduction of symptoms is key to the diminution of fall risk and to enabling patients to continue living independently.

Diagnosis and treatment of NPH is a mainstay of my practice, a skill set acquired years ago during my training at the Mayo Clinic. I believe it is very important that NPH be detected as early as possible so that patients can be appropriately treated and, ideally, continue to lead satisfying lives. This is but one reason why physicians across

Milwaukee, Waukesha and neighboring Wisconsin communities so often refer to me their NPH-suspected patients.

Please consider utilizing me as just such a resource for your own NPH-suspected patients. You and they will appreciate my accessibility and eagerness to help – not just in terms of diagnosis and treatment but with respect to answers to even the most vexing questions about this condition. I'm very sure that your patients will find my help invaluable – and that they will be so satisfied with the attention they receive that they will return to you happy and more willing than ever to continue trusting you with their ongoing care.

For further information about NPH, my approaches to treatment and information about my other neurology-specific surgical services, please call me at (414) 385-7150.



### Shekhar A. Dagam, MD

**FELLOWSHIP:** Stereotactic Radiosurgery, Mayo Graduate School of Medicine / University of Pittsburgh, PA

**RESIDENCY:** Neurological Surgery, Mayo Graduate School of Medicine, Rochester, MN

**MD:** With Distinction, George Washington University School of Medicine, Washington, DC

**BS:** Chemistry, University of California at Berkeley, CA

### Advanced, comprehensive solutions for...

- Chronic & acute neck & back pain
- Arm & leg pain
- Spine disorders & degenerative conditions
- Cervical & lumbar radiculopathy
- Spinal stenosis
- Herniated disc
- Compression fractures
- Spinal-cord tumors & AVMs
- Brain tumors, aneurysms & AVMs
- Microvascular nerve-compression disorders
- Epilepsy & Parkinson's disease
- Hydrocephalus ■ Stroke
- Carpal tunnel syndrome

### Leading-edge spine & brain procedures...

- All minimally invasive & open spine surgeries
- Complex spine reconstruction
- Surgery for relief of spine pain
- Craniotomy
- Removal/resection of spine & brain tumors
- CyberKnife® & Gamma Knife® radiosurgery
- AVM & aneurysm repair
- Epilepsy & Parkinson's surgery
- Awake brain mapping
- Nerve decompression
- Pain pumps & nerve stimulators
- Carotid endarterectomy
- Shunt insertion & revision

### Committed, caring & convenient...

- Friendly, caring doctor & staff
- Individualized care & attention
- Detailed & frequent physician-to-physician communication
- Early morning appointments available
- Appointments seen promptly
- Most insurance accepted & filed

2801 West Kinnickinnic River Parkway, Suite 550  
Milwaukee, WI 53215  
(414) 385-7150 | Fax: (414) 315-7159  
[www.dagamneurosurgery.com](http://www.dagamneurosurgery.com)