

## CASE REPORT

## Gait apraxia

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**Abstract:** Gait apraxia is most commonly a part of the Hakimov triad (gait apraxia, urinary incontinence, dementia) in normotensive hydrocephalus (NPH), although it may be a symptom of some other conditions. In our case the patient was a long term Parkinson's disease sufferer who developed normotensive hydrocephalus and consequently gait apraxia. Only after a third successive evacuation of the CSF his gait apraxia improved (Fig. 1, Ref. 15). Full Text (Free, PDF) [www.bmj.sk](http://www.bmj.sk).

Key words: hydrocephalus normotensivus, gait apraxia, parkinsonism, cerebrospinal fluid (CSF).

## Case report

A 65-year old male patient with 10 year history of Parkinson's disease was admitted to Split University Hospital. For the last two years his medications were levodopa preparations (Madopar) 375 mg/day, dopa agonist pramipexole (Mirapexin) 1 mg tds and a small dose of atypical antipsychotic clozapine (Leponex) half a 25 mg tablet on, for vivid dreams and mild insomnia.

Six weeks prior to this admission he could not walk or stand without some support. He became depressed because of this. His GP prescribed fluvoxamine (Fevarin) 100 mg. The symptoms were thought to be the natural progression of Parkinson's disease. He was referred to our hospital for review/change of his medications/treatment.

On admission, the patient was assessed using modified Hoehn and Yahr scale. He was assessed to be stage 3 (3/5). On UPDRS scale he scored 112 (112/ 171) points. His gait could not be assessed, neither could have the freezing phenomenon during walking and falls in ADL (Activities of Daily Living). He could not perform these tests. He did not have any side effects of antiparkinsonian drugs (e.g. dyskinesia or similar). During the day he was in 'off phase' for 25 % of his awake hours/time. There was medium rigidity of his limbs, more severe in his upper limbs. A mild upper limbs' rest tremor and postural tremor, moderate bradykinesia and hypokinesia were identified. His mental status was intact (mini mental scale 28/30) and there were no signs of dementia or urinary incontinence.

He was able to perform leg movements associated with walking, cycling or ball kicking and he could trace figures with his feet whilst lying or sitting. He was unable to weight a bear. We concluded he had gait apraxia.

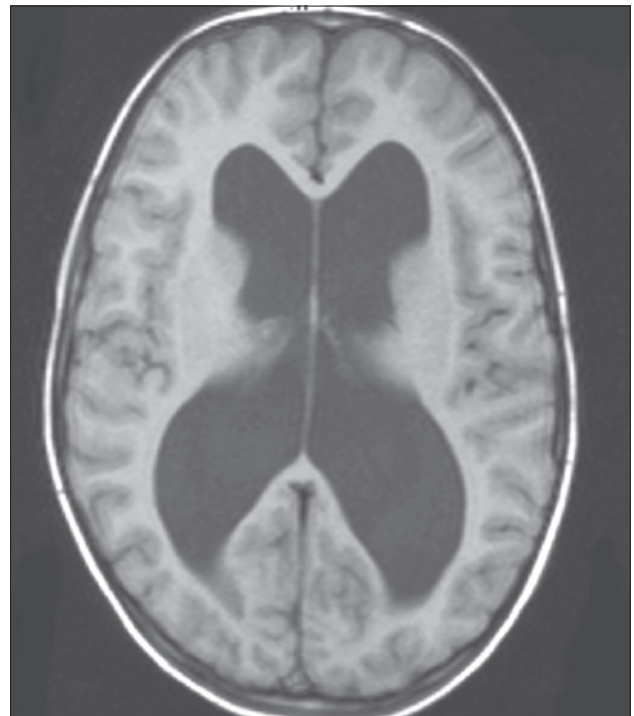
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**Acknowledgement:** This work was supported by authors effort only.

In bed the patient was able to perform the leg movements associated with walking, bicycling or kicking a ball and can trace figures with feet while lying or sitting but was unable when the legs were bearing weight. We concluded he had gait apraxia.

Head CT of brain and magnetic resonance imaging showed mild to moderate degree of ventricular enlargement (Fig. 1). There was no previous medical history of meningitis, encephalitis, SAH or similar potential cause of hydrocephalus. CSF pressure was measured using Ayer manometer and it was 180 mm Hg (not raised).



**Fig. 1.** Axial T1-weighted magnetic resonance image from our Parkinson's patient complicated with normal pressure hydrocephalus demonstrating the enlarged ventricular system which is out of proportion with sulcal atrophy.

With first lumbar puncture we evacuated 50 ml of CSF. Subjectively, patient's symptoms stayed unchanged and there was no objective improvement either. We consulted a neurosurgeon who did not think that surgical evacuation of CSF would improve patient's gait apraxia. The patient did not want a surgery. As our clinical diagnosis of gait apraxia was correct we repeated lumbar puncture four days later with patient's consent and evacuated 30 ml of CSF. A day after the second lumbar puncture the patient started walking on his own although his steps were short and uncertain. There were no complications. Four days after the second lumbar puncture we repeated head CT which showed lesser reduction of the ventricular width, compared with the previous CT. Nine days after his admission we decided to evacuate another 20 ml of CSF. Two days after the third LP the patient almost danced as he walked independently and safely and he was discharged from hospital. One month later on control testing the patient was without gait apraxia and wish for surgery.

## Discussion

Normal pressure hydrocephalus is dilation of the ventricular system without cortical atrophy and leads to a gait apraxia (often mistakenly attributed to parkinsonism), urinary incontinence and dementia – Hakim's triad (1–3). Treatment is ventriculoatrial, ventriculoperitoneal or lumboperitoneal shunt surgery (derivation of cerebrospinal fluid) but only about one-half of patients respond favorable and about one third have a good or excellent response (3, 4). A number of tests have been used to select suitable NPH patients for VP shunting – some of these tests like nuclear or CT cisternography (5), volumetric assessment (mean ventricular volume ratio, the mean brain volume ratio, the mean pericerebral CSF volume ratio, and the mean ratio between ventricular and pericerebral CSF volume) has no predictive value in differentiating between NPH patients who respond to ventriculoperitoneal shunt surgery and those who do not (6) Pressure monitoring via an intracranial transducer is invasive and runs the risk of infection (7, 8).

An increased aqueductal CSF flow void on the MR images, thus, hyperdynamic CSF flow is an indirect, but easily measured, sign of normal CBF and shunt-responsive NPH (9–11).

The oldest but not less important and reliable is "tap test" (lumbar puncture and removal CSF). It has been used extensively (12, 13), although some (14) have doubted its accuracy for predicting the outcome from shunting. Recently, a ventricular tap test has shown much greater sensitivity and specificity in selecting which patients will respond to shunting (15). The evaluation of the effect of multiple CSF evacuations on improvement of NPH symptoms and predicting the outcome from shunting (especially in cases where symptoms may be overlapped) has not been made and needs to be done.

Our case shows that repetitive "tap test" has good predictive value and it is not reasonable to make the definite decision about the effect of CSF evacuation in normotensive hydrocephalus after the first evacuation. It showed that multiple successive evacuations of small amounts of CSF are sometimes needed to get the satisfactory result and measurably assess the positive predictive

value of the evacuation of CSF especially in cases where NPH complicated with parkinsonism. In this case we got positive resolvment of gait apraxia. However the evaluation of the effect of multiple CSF evacuations on improvement of cognitive status and urinary incontinence needs to be done by further studies.

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Received September 29, 2008.

Accepted November 17, 2009.