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Idiopathic Normal Pressure Hydrocephalus Accompanied by Seizure: A Case Report

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Authors' contributions

This work was carried out in collaboration between all authors. Authors HA, YA and NT designed the study, wrote the protocol, and wrote the first draft of the manuscript. Authors TA, IG, AÇ managed the literature searches. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

The clinical features of idiopathic normal pressure hydrocephalus (iNPH) are characterized by cognitive impairments, gait disturbances, and/or urinary incontinence. These symptoms can also include seizures following a shunt placement but there is a lack of data regarding seizures as a presenting symptom in patients with iNPH. Thus, the present report describes a case of iNPH accompanied by seizures which resolved after the placement of a shunt.

Keywords: Normal pressure hydrocephalus; seizure; epilepsy; shunt.

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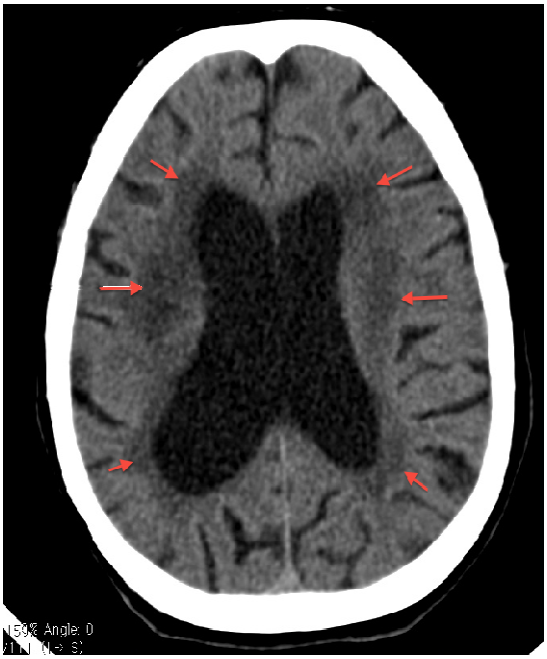
1. INTRODUCTION

The clinical characteristics of idiopathic normal pressure hydrocephalus (iNPH) include cognitive impairments, gait disturbances, and/or urinary incontinence. The prevalence of iNPH is approximately 1.4% in the general population and 2.9% in patients older than 65 years of age; elderly patients typically exhibit communicating hydrocephalus and a normal mean intracranial pressure (ICP) [1-5]. In fact, the presence of the classic triad of iNPH is not unusual in elderly patients and is likely that various diseases may be suspected during the differential diagnosis of this disorder [6-8]. Thus, the correct diagnosis is important.

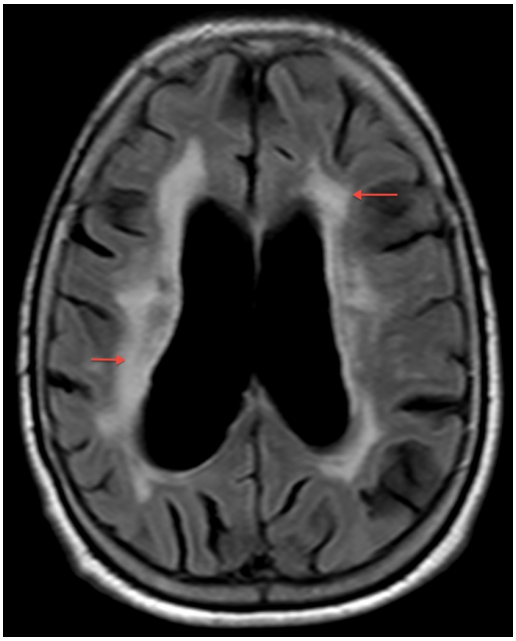
Seizures may be observed in patients with hydrocephalus after a subarachnoid hemorrhage or post-traumatic hydrocephalus and also as a complication following shunt procedures to relieve intracerebral hematomas, subdural effusions, or hematomas. Seizures have been reported as a postoperative complication in patients with iNPH [9,10]. However, to the best of our knowledge, no studies have identified seizures as a presenting symptom in patients with iNPH and thus, the present report describes the case of a patient with iNPH who presented with generalized epileptic seizures.

2. CASE REPORT

A 66 year old woman with suspected hydrocephalus was referred to our clinic from another clinic. The patient was suffering from urinary incontinence, gait disturbances, and a decline in cognitive function. She walked using small steps with an anteflexion posture and was complaining of drop attacks and generalized epileptic seizures that had been occurring over the last 2 months. Although the patient was prescribed phenylhydantoin and levetiracetam, her seizures recurred continually at the rate of approximately 2-3 seizures per week. Brain computed tomography (CT) and magnetic resonance imaging (MRI) scans revealed an enlargement of the lateral, third, and fourth ventricles without an accompanying space occupying lesion (Picture 1 and 2).



Picture 1. Axial computed tomography (CT) image of the brain showing ventricular dilatation, periventricular edema, and a blunting of the ventricular horns



Picture 2. Axial fluid inversion attenuation inversion recovery (FLAIR) brain magnetic resonance imaging (MRI) scan demonstrating the characteristic findings of hydrocephalus

An electroencephalogram (EEG) of the patient revealed epileptic activity that included mid-frequency sharp waves with moderately high amplitudes and sharp-slow-wave activity without recurrent generalization originating from the bilateral occipital regions (Fig. 1). A lumbar puncture was performed and approximately 20 cc of cerebrospinal fluid (CSF) was drained three times every other day. The opening pressure was 150 mm H_2O and the biochemical parameters of the CSF were within normal limits. After the completion of the three drainages, the patient showed improvements in her gait disturbances and urinary incontinence. Moreover, no seizures were observed during this time period while the patient was using antiepileptic drugs. However, after 30 days, her previous symptoms recurred and the patient was admitted after suffering a generalized seizure. Subsequently, a ventriculoperitoneal shunt operation was performed in which a pressure-adjusted anti-siphon shunt implanted and its pressure was adjusted to 130 mm H2O. Following the operation, the patient's complaints showed a fast resolution and her antiepileptic drugs (phenylhydantoin 3 x 100 mg and levetiracetam 2 x 500 mg) were discontinued under close control until approximately 3 months after the shunt placement. The patient is still under clinical control but has not experienced a seizure for more than 1 year even in the absence of any antiepileptic drugs.

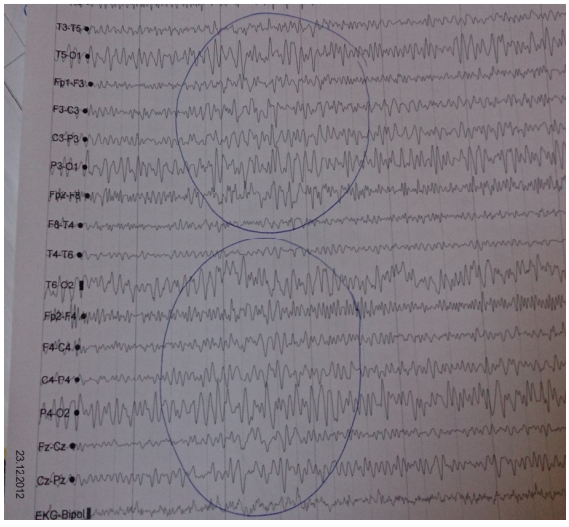


Fig. 1. Electroencephalogram (EEG) of the patient

3. DISCUSSION

Although iNPH is a syndrome characterized by gait disturbances, cognitive dysfunction, and urinary complaints, gait disturbances are the first and the most prominent component of this disorder [11-13]. Additionally, ventricular dilatation, normal CSF pressure, and, a reversal of the classical triad of symptoms following shunt surgery are other well known characteristics of iNPH patients. This syndrome may be classified as a communicating hydrocephalus [1].

The triad of gait disturbances, cognitive impairments, and urinary incontinence is especially common in the elderly [1]. However, these symptoms may be observed in many syndromes or diseases; thus the differential diagnosis of iNPH from those of neurodegenerative diseases (Alzheimer's disease, Parkinson's disease, vascular dementia, Lewy body disease, frontotemporal dementia, amyotrophic lateral sclerosis, and multisystem atrophy spongiform encephalopathy), cerebrovascular diseases (stroke, multi-infarct state, Binswanger's disease, vertebrabasilar insufficiency), other hydrocephalus disorders (aqueductal stenosis, arrested hydrocephalus, long-standing overt ventriculomegaly syndrome, non-communicating hydrocephalus), infectious disorders (Lyme, human immünodeficiency virus, and syphilis), urological disorders (urinary tract infection, bladder or prostate cancer, and benign prostatic enlargement), and other miscellaneous reasons (B12 deficiency, collagen vascular disorders, depression, traumatic brain injury, spinal stenosis, Wernicke's encephalopathy, carcinomatous meningitis, and spinal cord tumors) is very important [14].

The incidence of the classical triad of symptoms in iNPH patients is not known exactly. Gait disturbances are the most common and earliest symptoms and manifest in 90-100 of cases. These types of disturbances are characterized by a small-stepped gait, magnet gait, and broad based gait and most of these patients are unstable and walk slowly [15-18]. These patients walk slowly and unstably [15-18]. Cognitive impairments are observed in 78-98% of iNPH cases; psychomotor speed, attention, and working memory are the most frequently affected cognitive functions in these patients [19-26].

Urinary dysfunction is observed in approximately 76-83% of cases and includes an overactive bladder (which manifest primarily as increased nocturnal urinary frequency), urgent urinary frequency, a reduction of the maximum flow rate, an increase in residual volume, and reductions in bladder capacity on an urodynamic test [27]. The major symptoms of iNPH are observed concomitantly in approximately 60% of cases [28-31].

Other symptoms or findings may also be seen in patients with iNPH, especially psychiatric symptoms and or abnormal neurological findings. Larrson et al. [32] observed the psychiatric symptoms including apathy, anxiety, delusions, emotional instability, a depressive state or impatience in 88% of cases. Bradykinesia, hypokinesia, paratonic rigidity, glabellar reflex, snout reflex, akinesia, tremor at rest, and palmomental reflex are the most common abnormal findings on a neurological examination [33,34]. In rare instances, forced crying, laughing, and convulsions have also been reported, but the convulsions observed only after a shunt complication in this study [10]. Seizures typically manifest in iNPH patients as a postoperative complication, but in the present patient drug-resistant seizures were seen during the preoperative period as a presenting symptom. However, these seizures were resolved completely after the insertion of a shunt.

iNPH is characterized by ventriculomegaly that is due to abnormal accumulation of CSF caused by an increase in ICP. This pressure diminishes gradually falls but remains at a high normal level (150-200 mm H_2O). Therefore, high pressure levels were not observed during ICP measurement and accordingly, iNPH patients do not typically suffer from the classical signs and symptoms of increased ICP. However, the enlargement of the ventricles may lead to increased pressure on adjacent tissues. Although the etiology of the seizures in the present patient remains uncertain, the above mentioned mechanism is a likely candidate.

4. CONCLUSION

In conclusion, iNPH may present with seizures which will likely be resolved following the placement of a shunt.

CONSENT

All authors declare that 'written informed consent was obtained from the patient for publication of this case report and accompanying images.

ETHICAL APPROVAL

Not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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