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Case Report

A Case of Lacunar Stroke in a Patient with Possible Normal Pressure Hydrocephalus (NPH)

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Abstract

Background: Normal pressure hydrocephalus (NPH) is a condition seen in the elderly, characterized by gait disturbances, urinary incontinence, and cognitive impairment. However, sudden onset neurological deficits suggest a vascular event rather than NPH.
Methodology: We report a case of a 65-year-old male who presented with sudden onset gait difficulty and speech impairment, initially suspected to be idiopathic NPH. The diagnostic process and management strategies are discussed.
Results: The patient's symptoms, including insidious gait difficulties, speech impairment, and memory loss, led to a suspected diagnosis of NPH. However, the sudden improvement of neurological deficits indicated a vascular cause. Computed Tomography (CT) imaging identified supporting evidence of a lacunar stroke, leading to a revised diagnosis.
Conclusion: This case highlights the importance of considering vascular events in the differential diagnosis of NPH, especially when sudden neurological deficits improve rapidly. Early identification and differentiation between NPH and vascular events are crucial for appropriate management, particularly in low-resource settings.

Keywords: Normal Pressure Hydrocephalus; Gait Abnormalities; Surgical Shunting; Lacunar Stroke.

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Introduction

Normal pressure hydrocephalus (NPH) is a syndrome that occurs primarily in the elderly, characterized by a classic triad of symptoms: gait disturbance, urinary incontinence, and cognitive decline.[1] These symptoms result from an abnormal buildup of cerebrospinal fluid in the brain's ventricles, leading to ventriculomegaly. NPH is a rare but treatable cause of dementia and can be mistaken for other neurodegenerative diseases such as Alzheimer's or Parkinson's disease.[2]

Lacunar strokes are a type of ischemic stroke that occurs when one of the small arteries deep within the brain become blocked. These strokes are typically small, affecting areas such as the basal ganglia, thalamus, or pons, which are non-cortical regions of the brain. Due to their small size and deep location, lacunar strokes might not cause immediate, severe symptoms, but they can contribute to cumulative neurological damage over time, especially if multiple lacunar infarcts occur.

Diagnosing NPH is challenging, especially in low-resource settings where advanced diagnostic tools may not be readily available. This case study discusses the complexities involved in diagnosing and managing a case initially suspected to be NPH but later identified as a lacunar stroke. The report underscores the significance of considering vascular events in the differential diagnosis of NPH, given the potential overlap in clinical presentation.

The case discussed in this case report was diagnosed in a general practice clinic, a place where it is often missed or misdiagnosed; this has been credited to the difficulty attributed to its diagnosis because of the non-specific symptoms it would usually present with, the low level of awareness about the disease among physicians and the relatively recent recognition of the disease since it was first described by Salamon Hakim of Bogotá, Colombia, in 1965.[3]

This study will shed more light on the practicality of making an early diagnosis of normal-pressure hydrocephalus and differentiating its presentation from a lacunar stroke, it would inform the practice of early-stage career physicians and general physicians, especially in developing countries like Nigeria where this was diagnosed.

Case Presentation

A 65-year-old married retiree Mr E. A was brought into the consulting room of our outpatient clinic at Downtown Specialist Hospital on the 15th of November 2023. He presented with a day history of difficulty walking and difficulty speaking, symptoms were insidious in onset, first noticed by his wife in the early hours of the day before the presentation. There was an associated history of memory loss within the last year however the relative could not ascertain when it was first noticed, there was also a single episode of bedwetting that morning which was happening for the first time.

There was no history of trauma, no history of fever, no history of seizure, no history of dizziness or fainting spells, no history of headaches or visual blurriness, and no history of tremors.

He had no history of similar illness in the past or a family history of the illness either, he has not been diagnosed with any chronic medical illness in the past, and he has never had surgery done before, he does not drink alcohol, he does not smoke cigarettes or use any form of recreational drugs, he lives with his wife and she is very supportive.

He was brought into the consulting room supported by his relatives with a shuffling gait, he was cooperative and maintained poor eye contact. His speech was sluggish, less expressive, did not answer questions directed at him most of the time, reduced tone, and low volume. The mood was normal (as reported by the patient), and affect, was restricted. His thought content could not be assessed. No perceptual abnormalities.

On Central nervous system examination, the patient was found to be conscious and alert, but attention and concentration were impaired, he was oriented in person, in place, and at the time, with no signs of meningeal irritation, no cranial nerve deficit, right and left upper limbs were grossly normal as well as the lower limbs with normal muscle tone and reflexes with a power of 4/5 globally. All other systems were normal on examination, and he had a Mini-mental Test Score of 20/30.

A diagnosis of a suspected normal pressure hydrocephalus was made, and an urgent CT scan was requested for further evaluation.

CT scan revealed a prominent ventricular system (ex-vacuo), periventricular ischaemic demyelination changes, cavum septum pellucidum, and a deep and prominent basal cistern and Sylvian fissure.

A diagnosis of normal pressure hydrocephalus was made, and the patient was subsequently referred to the neurology clinic at Federal Medical Centre Abeokuta for further specialist care. Before the referral visit, his symptoms had spontaneously subsided the following day of presentation, he was able to mobilize with a normal gait, and his speech was fluent and coherent however he still had some degree of cognitive deficit with a mini-mental test score of 20/30, we entertained that he had suffered a lacunar stroke contributing to his overall presentation.

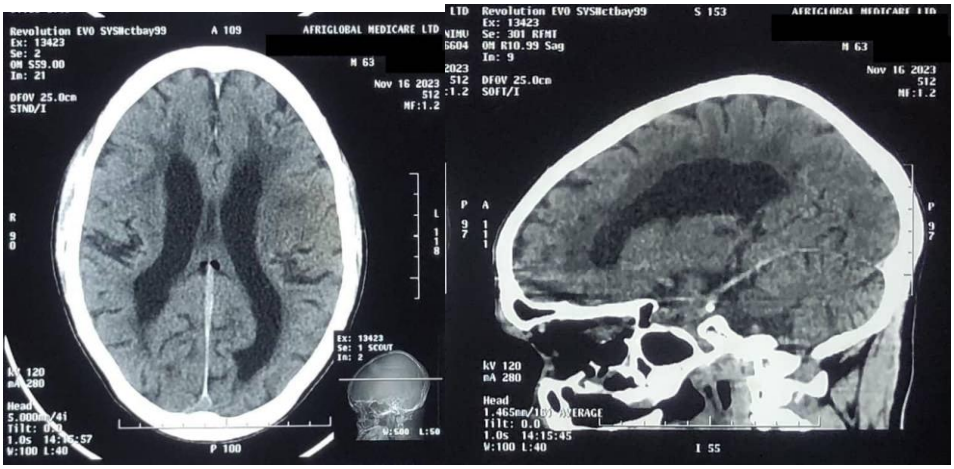
A follow-up visits at our clinic revealed that he was commenced on a tab of Acetazolamide 250MG once daily, a tab of Neurovitamin once daily for one month, a tab of Vitamin E 1000 IU daily for one month, and a tab of Citicoline 500MG twice daily for one month at the specialist clinic and booked for a ventricular shunting surgery.

Discussion

Studies on prevalence have revealed that the crude rates of probable normal pressure hydrocephalus (NPH) vary between 0.01% and 0.022%, while the prevalence for possible NPH is reported at 0.029%. Furthermore, age-specific rates show a range from 0.0033% in individuals aged 50-59 to 5.9% in those aged 80 years or older.[4][5] More geographic-specific prevalence and incidence in Africa and Nigeria are unreliable however it is estimated that the numbers are more because of untreated/poorly treated neonatal meningitis and nutritional deficiencies.[6]

Patients with Normal pressure hydrocephalus will present with gait abnormalities, dementia, and urinary incontinence, these symptoms have an insidious onset but would have been evident for at least 6 months, however, the family of the patient may not be alerted until a precipitating event occurs.[6]

NPH has been documented as a multi-etiological disorder with possible overlapping pathophysiology with Cerebrovascular disease (CVD) and Alzheimer's disease.[7] It is furthermore noteworthy that the sudden neurological event with subsequent recovery experienced in the patient represents a lacunar stroke and should be further investigated by Diffusion-weighted imaging (DWI) to help differentiate an acute from a chronic infarction. The CT scan revealed features of periventricular ischaemic demyelinating changes that this patient had suffered which invariably contributed to his clinical presentation.



Figures 1.0 CT scan Images of the patient

Lacunar strokes depending on the area of brain involvement may present without symptoms or with memory, language, and judgment deficit, a certain lacunar stroke affecting the pons and internal capsule will present with dysarthria that manifests as difficulty pronouncing words due to voice box muscle weakness, including tongue, larynx, and other facial muscle weakness. Contralateral clumsiness of the upper extremity is present with preserved motor strength. Difficulty with subtle fine movements (e.g. writing or tying a shoelace) may be present.[8]

Gait abnormalities in NPH are symmetric and would typically constitute any of the following: difficulty with transitional movement, gait initiation failure, multi-step turns with instability, retro propulsion, or antero propulsion of stance, an objective way this may be assessed using a standardized gait evaluation score like Tinetti score or Boon scale.

In the initial phases, individuals might have a sense of urgency without complete loss of bladder control or may leak a small amount of urine before reaching the restroom. A nocturnal increase in urinary frequency is a typical occurrence. Patients typically recognize their need to urinate and express apprehension about potential accidents. Notably, incontinence without being aware of the urge to urinate or without realizing that one's clothing is wet is not a typical feature of idiopathic normal pressure hydrocephalus.[1]

The cognitive impairment seen in normal pressure hydrocephalus includes symptoms such as apathy or lack of motivation, daytime sleepiness, slowed psychomotor speed, and other signs of frontal-subcortical dysfunction.[9]

The average time between the onset of symptoms and a diagnosis of hydrocephalus appears to be significant and is often years.[10]

As established earlier, neuroimaging is central to making the diagnosis of normal pressure hydrocephalus. It is usually evident by enlarged ventricles seen on a CT scan but much more clearly on magnetic resonance imaging (MRI). Although it is difficult to account for enlarged ventricle for age, the Evans ratio (the ratio of the widest diameter of the frontal horns to the widest diameter of the brain on the same axial slice) is an international guide for making a diagnosis, a value of >0.33 is a diagnostic index for ventriculomegaly.[11]

The case of Mr E. A was diagnosed by radiological investigation precisely a CT scan the day after the presentation. The clinical presentation, the age of the patient, and the time of presentation were in tandem with normal pressure hydrocephalus and a sudden neurovascular event consistent with a Lacunar stroke.

The gait abnormality was the first obvious symptom that alerted the family and was contrary to the day before when he was fine, the gait abnormality was due to weakness of the lower limbs, which results from progressive enlargement of the lateral ventricular system that results in impingement of the corticospinal tract motor fibers; urinary incontinence was evident on the morning of the presentation, which could have been due to a decrease in the inhibition of bladder contraction and instability of the detrusor; the patient also had some degree of memory loss which is usually present in about 60% of patients and is due to distortions predominantly at the frontal lobe and the subcortex.[11][12]

The clinical examination which included a cognition assessment tool called mini-mental test score and investigations did point to a cognitive decline in support of Lacunar stroke and normal pressure hydrocephalus. Due to the need for expertise not being available at our facility and for further management, the patient was appropriately referred to a tertiary specialist center. Although before arrival to the referred facility symptoms had spontaneously improved, the management constituted a cognition and memory enhancement medication, a carbonic anhydrase inhibitor, and neural multivitamins and supplements and he was scheduled for a month appointment for further evaluation as documented at a follow-up visit back at our facility.

The patient and the relatives were pleased with the care received at our facility and were compliant with scheduled follow-up visits after their scheduled visit to the Tertiary health facility for further expert management.

The definitive management for NPH remains surgical, a procedure called ventriculoperitoneal shunting; drainage of excess cerebrospinal fluid within the ventricles through a surgical shunt into the peritoneal space which acts as a physiological drain, the use of diuretic like acetazolamide has been shown to reduce Cerebrospinal fluid (CSF) production but it is used only on palliative care or in equivocal cases before a diagnosis is made.[6]

Lacunar strokes are managed like other acute ischemic strokes, when they are diagnosed on presentation and haemorrhagic stroke has been ruled out, thrombolysis should be offered if within the presentation window of 4.5 hours otherwise thrombectomy can be done to remove clots. Good blood pressure control, smoking cessation, dual antiplatelet therapy, and statins should also be instituted as further strokes can recur.[7]

Conclusion

The case detailed in this report highlights the sequential steps taken to overcome the hurdles that make a case like normal pressure hydrocephalus be diagnosed and treated appropriately in a low-resource setting. Evaluating such clinical presentation highlights a likelihood for misdiagnosis or underdiagnosis and practicing physicians should be clinically aware of such possible clinical presentation. Furthermore, it emphasizes the role that family support can play in the success of the management of a patient as well as the availability of high-end radio-diagnostic equipment like the CT scan which although is still largely unavailable or unaffordable to the average Nigerian middle-class and low socio-economic class.

Normal pressure hydrocephalus can be diagnosed early, especially at first presentation, evaluated, and managed appropriately. The mainstay of management of normal pressure hydrocephalus is still surgical shunting and a relief of the pressure can result in a spontaneous reversal of some of the presenting symptoms.

As a multi-etiological disease, it can also be diagnosed on incidental radiological findings just like in patients presenting with a suspected lacunar stroke, a gray area where radiodiagnosis can be useful in elucidating the pathology, the prognosis however is better compared to other large vessel ischaemic stroke and patients can make good recovery but may suffer possible cognitive decline and dementia.[13]

Declarations: All necessary consents were taken in written form before commencing the documentation of this study, this can be made available on request. All forms of referenceable identity have been concealed from this report and other digital materials attached to this report.

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