Case report

New onset psychosis with idiopathic normal pressure hydrocephalus

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Abstract

Idiopathic normal pressure hydrocephalus (INPH) may present with psychotic symptoms even before gait disturbance, urinary dysfunction, and cognitive impairment. A case of a 22 years-old male with INPH responded to Risperidone 2mg twice daily for paranoid delusions without neurological intervention. Ten Similar cases of INPH were identified in the literature by Medline search between 1996 and 2015 who presented with major psychiatric symptoms before clinical triad of INPH. INPH may initially present with major psychiatric symptoms than neurological symptoms. Further clinical trials are needed to investigate if early treatment of INPH aborts psychiatric symptoms.

Key words: Normal pressure hydrocephalus, psychosis

Normal pressure hydrocephalus (NPH) is a clinical syndrome with a triad of abnormal gait, dementia and urinary incontinence.¹² NPH can be either obstructive or communicating with a patent aqueduct of Sylvius. NPH is classified as idiopathic NPH (INPH) when there is no obstruction, no obvious past history and no evidence of secondary causes like head trauma, space occupying lesion, infection, carcinoma or sub-arachnoid hemorrhage. INPH more often can initially present with psychiatric symptoms and early surgical intervention for management of psychiatric symptoms is not considered.³⁻⁵ There are several imaging and recently molecular studies have revealed involvement of various areas of brain especially prefrontal areas contributing to psychiatric symptoms like depression, perceptual disturbances, anxiety, etc.⁶⁻⁹ Here, we present a case of INPH which was detected as a routine screening for first episode of psychosis.

Case report

A 22 year old male was admitted to our hospital with a two year history of paranoid delusions which had acutely worsened over three weeks. The patient had initially developed a paranoid delusion that the police were after him. The delusions had become so worrisome to the patient that he had started to cope by experimenting with both cannabis and briefly, methamphetamine within the two weeks preceding admission. Prior to this acute worsening, patient’s family reported that his functional capacity was declining and he was becoming more isolated. For example, he had quit his job and school, ended a stable relationship, left home and chose to live on the streets as a means of evading the police whom he feared were going to harm him. At time of interview, patient endorsed depressed feelings with disturbed sleep and appetite. He denied auditory or visual hallucinations, manic symptoms or anxiety as well as an absence of suicidal or homicidal ideations. Genetic contribution for primary thought or mood disorder was unknown. He had no past medical history and was not taking any medications. On mental status ex-
am, patient was disheveled, with poor hygiene. His mood was depressed and his affect was flat and consistent with mood. His sensorium was intact and his intelligence was deemed average. The patient’s thought process was coherent, illogical goal directed, and with paranoid delusions. He denied any current or past suicidal or homicidal ideas. The patient’s physical examination and neurological examination was within normal limits. Other laboratory workup ruled out infection and metabolic causes. Radiographic findings with CT and MRI (with and without contrast) were suggestive of moderate communicating hydrocephalus involving the bilateral ventricles, third ventricle, cerebral aqueduct and fourth ventricles. The patient was hospitalized in the inpatient psychiatric unit. Risperidone 1mg twice daily was started and, titrated to 2mg twice daily. Patient showed drastic improvement of his psychotic symptoms and no side effects were observed. Neurosurgery was consulted and recommended medical management without acute neurosurgical intervention at that time.

Methods

Peer reviewed case reports and series with non-obstructing normal pressure hydrocephalus (NPH) were reviewed between 1996 to May 2015 by searching words like “Hydrocephalus, Normal Pressure/ or Hydrocephalus”, with psychotic Disorders or anxiety disorders or mood disorders or cognition disorders.

### Table 1: Number of Cases between 1996 to May 2015

<table>
<thead>
<tr>
<th>Patient No</th>
<th>Age</th>
<th>Sex</th>
<th>Initial presentation of NPH</th>
<th>Response to APM</th>
<th>Surgical Intervention</th>
<th>APM +/- surgical intervention</th>
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</tbody>
</table>

(+)* represent presence of symptom, (-)* represent absence of symptom, (N) implies neurological symptom/s, (P) implies psychiatric symptom/s, APM implies antipsychotic medication

Out of 202 publications using MEDLINE search with above search words, 11 publications were identified using inclusion criteria. Our inclusion criteria included patients with initial presentation with psychiatric or neuropsychiatric symptoms with INPH of any age group. We excluded patients who presented with only initial neurological symptoms or who had secondary causes of NPH.

Discussion

With this case, our patient presented with two years of paranoid delusions preceding his diagnosis of communicating INPH. It was noted from his history that paranoid delusions appeared first and patient used substances like marijuana and amphetamines to cope with his delusions, and that might have worsened his existing paranoia. We included schizophrenia, delusional disorder and psychotic disorder NOS in the differential. However, we could not exclude organic etiology such as NPH as the primary cause for psychosis. As we show in the above results, more than 50% of patients with INPH initially presented with psychiatric symptoms. Furthermore, surgical shunting resulted in resolution of psychiatric symptoms along with resolution of concurrent neurological symptoms. Interestingly, the rationale for the shunting was the presence of neurological and not psychiatric symptoms. Thus there seems to be causal connection between NPH and psychosis. Recent Nuclear imaging studies have shown poor perfusion of periventricular, prefrontal regions, basal ganglia in INPH. Also brain functioning imaging studies revealed involvement of orbitofrontal and anterior cingulate cortex in INPH. Involvement of these areas of brain may possibly explain psychiatric symptoms like cognitive impairments, apathy, depression, psychosis, mania, aggression. Also some molecular studies suggested treatment of prefrontal cortical stress pathways for schizophren-
nia, bipolar disorder, and post-traumatic stress disorder.

Prefrontal cortical stress pathways include prefrontal dysfunction by excessive dopamine D1 receptor stimulation via cAMP intracellular signaling or by excessive norepinephrine stimulation of α1 receptors via phosphatidylinositol–protein kinase C intracellular signaling. Notably, several of the patients included in our review were as young as our patient (early 20’s) making a stronger case for an underlying neurological cause for positive psychiatric manifestations in our patient thus changing the conceptualization of the patient’s symptoms as neuropsychiatric in nature. On the other hand, as the patient’s family history of schizophrenia was unknown and the patient did have a history of cannabis use and brief methamphetamine use these factors in combination may have hatched a primary psychiatric diagnosis. However, per history, patient was presenting with paranoid delusions prior to use of crystal methamphetamine.

Additionally, in one of the case reports a patient where a diagnosis of schizophrenia preceded diagnosis of NPH the patient failed to respond to antipsychotic medication and only the surgical treatment of the NPH resulted in improvement of the psychotic symptoms. This further suggests the idea of a causal connection between NPH and psychosis. Given the presenting information from our case report, the most appropriate diagnosis for our patient was psychosis due to a general medical condition (NPH) rather than a primary thought disorder.

Conclusion

Initial presentation of NPH may include psychiatric symptoms; therefore it is important to consider NPH (likely communicating) as part of differential for first episode psychosis. From Table 1, when the underlying INPH was treated surgically, there was significant improvement of psychiatric symptoms thus allowing for the discontinuation of psychiatric medications. Further clinical trials are needed to investigate if early treatment of INPH aborts psychiatric symptoms.

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Conflict of interest: None

References