Hypokalemia and Psychosis: A Forgotten Association

Ella Hong, M.D.

CASE VIGNETTE

A 41-year-old African American woman with a past diagnosis of schizoaffective disorder and medical history of hypertension and chronic obstructive pulmonary disease (COPD) was brought to the emergency department for auditory hallucinations and paranoid delusions. Upon initial evaluation, she was irritable and agitated and reported active suicidal ideation associated with voices accusing her of being a murderer. She had recently moved into her brother's apartment due to financial hardship and was unemployed. Family history was notable for a brother with schizophrenia. The patient denied a history of illicit substance use. Medications included hydrochlorothiazide for hypertension and albuterol as needed for COPD. The patient had been maintained on clonazapam and paroxetine for depression for the last several years without recent medication adjustment but had run out of medications a week prior to admission. Routine laboratory tests on admission revealed a potassium level of 2.3 mEq/L and negative urine toxicology.

MANAGEMENT AND OUTCOME

Upon arrival, hypokalemia was treated with 60 mEq intravenously and 40 mEq p.o. of potassium chloride. Due to severe agitation and aggression, the patient required pharmacologic and physical restraints. Repeat potassium level was 2.9 mEq/L. Potassium chloride 60 mEq intravenously was again supplemented, and repeat level was 3.5 mEq/L before transfer to the floor. Hydrochlorothiazide was discontinued for possible contribution to hypokalemia. The patient's delusions and auditory hallucinations improved the next day of admission. Paroxetine and clonazepam were restarted based on the history of good response for depressive and anxiety symptoms. Neuroleptics were discontinued, as the patient no longer endorsed auditory hallucinations or paranoid delusions. She received 40 mEq p.o. of potassium chloride each day until her discharge, with a final level of 3.4 mEq/L on the day of discharge.

INDEX EPISODES

From chart review, the patient presented to the emergency department with various symptoms and was found to be hypokalemic in the span of 7 years. There were 11 hospital visits recorded, and in nine instances, a potassium level of 3.5 mEq/L and below was recorded. Out of these nine cases, seven cases were for psychiatric care, with a potassium range of 2.7 mEq/L–3.3 mEq/L. In the first episode of hypokalemia, the patient presented with insomnia and bizarre behavior. Her potassium level was 2.7 mEq/L, and she was on hydrochlorothiazide for hypertension. The second time, the patient presented to the emergency department with paranoia and auditory hallucinations. Her potassium level was 2.7 mEq/L, and the same medical management for hypertension was continued. On the third occasion, she presented with irritable mood and auditory hallucinations. She had been on paroxetine, trazodone, and lorazepam, as well as amlodipine for hypertension. Her potassium level was 3.1 mEq/L. On the fourth presentation she presented with paranoia and auditory hallucinations, and her potassium level was 3 mEq/L. The patient had been on quetiapine, sertraline, paroxetine, and trazodone in the past with recorded noncompliance.

DISCUSSION

Hypokalemia is an identifiable, clinically important but often overlooked condition in psychiatric patients. Compared to the general population, the prevalence of hypokalemia (20%) in acute psychiatric patients is surprisingly high (1). The above case highlights the clinical possibility that hypokalemia may cause symptoms of psychosis in psychiatric populations.

Hypokalemia can cause a wide range of clinical manifestations, such as muscle weakness and areflexic paralysis. Cardiac manifestations include arrhythmia and EKG changes (2). Neuropsychiatrically, hypokalemia may present with memory impairment, disorientation, and confusion. Hypokalemia may mimic neurovegetative symptoms, such as weakness, lethargy, apathy, fatigue, and depressed mood (2). Additionally, hypokalemia can mimic anxiety reactions, such as headache, irritability, nervousness, paresthesias, visual disturbances, and muscle discomfort (3).

More importantly, hypokalemia has previously been associated with psychotic exacerbations in patients with schizophrenia. One study revealed that in 259 patients with schizophrenia with acute exacerbation, 6.9% had dehydration, approximately 30% had hypokalemia and leukocytosis, and 66% showed elevated serum muscle enzymes (4). It was postulated in the study that increased endogenous catecholamine levels might lead to a decrease in plasma potassium.

Thus, the mechanisms of hypokalemia in acute exacerbation have been further explored. Based on several reports, antipsychotic agents are believed to cause hypokalemia by changes in adrenergic activity (5). In a study exam-

ining patients with different inpatient psychiatric diagnoses and the variance of hypokalemia, it was postulated that hyperadrenergic state might drive beta-2-recepter stimulation, causing influx of potassium into skeletal muscle, resulting in hypokalemic trend (6). Duration of illness could also affect the sensitivity or density of the beta-2-receptor, which was reflected in the results of one study showing that disorders of relatively short disease duration had lower mean serum potassium values than disorders of longer duration (7). Thus, diagnoses with high acuity like acute psychosis would reflect lower potassium values compared to other diagnoses in the maintenance phase.

It is interesting that several reports suggest hypokalemia was associated with acute decompensation of psychotic symptoms (8). According to a case study, two episodes of acute decompensation of chronic paranoid schizophrenia were related to hypokalemia from use of thiazide diuretics (8). Other variables were also mentioned, such as use of antipsychotic medication upon admission and possible medication noncompliance, which could deter the direct correlation between hypokalemia and psychosis. However, it is still notable to mention that an episode of acute worsening of psychosis was treated successfully by potassium supplement in this case (8). Another case report discussed a patient with a history of psychosis presenting with an acute psychotic decompensation who was treated adequately with intravenous potassium supplement (7). Although other factors were not explained in detail, such reports suggest the importance of recognizing and treating hypokalemia in acute psychotic decompensation and encouraging thorough medical evaluation for such presentations.

KEY POINTS/CLINICAL PEARLS

- In psychiatric patients, hypokalemia may mimic a wide variety of symptoms such as weakness, lethargy, apathy, fatigue, depressed mood, headache, irritability, nervousness, paresthesias, visual disturbances, and muscle discomfort.
- Evidence suggests that hypokalemia may serve as an important clinical condition in acute psychiatric diagnoses such as psychosis.
- Studies suggest hypokalemia results from hyperadrenergic state might drive beta-2-recepter stimulation, causing influx of potassium into skeletal muscle, and duration of illness could affect the sensitivity or density of the beta-2-receptor, reflecting that diagnoses with high acuity like acute psychosis would reflect lower potassium values compared to other diagnoses in the maintenance phase.

CONCLUSIONS

One must heighten the suspicion of all dimensions of illness, including investigating possible metabolic causes for acute decompensation of psychosis. The available literature is not sufficient to clearly justify the association of hypokalemia with psychosis and to impose absolute positive correlation with treating hypokalemia leading to improvement of psychosis. At this time, further systematic controlled studies into the association and causality of hypokalemia and psychosis are needed. However, management of serum potassium level could serve as a valuable way to better the overall outcome of symptoms in acute psychotic exacerbation.

Dr. Hong is a second-year resident in the Department of Psychiatry, Wayne State University, Detroit.

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