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Following a Family Legacy: A Personal Journey

Jiansan Gu, M.D., and Maria Amir

Liyi just finished his shift at the local outpatient psychiatric clinic. The frozen snow on the ground must have reminded him of his time in Vladivostok, Russia, where, after finishing his psychiatry residency in China, he spent the better part of a year as a fellow studying the intricacies of the diagnosis and treatment of psychosis. As he trudged through the mixture of sleet and ice, he arrived at the gates of his home in Jinan. It was a Soviet-style block apartment, typical of the Brutalist architecture that was a living manifestation of the state's total control over society. Liyi noticed the smell of burnt diesel fuel, and a green paramilitary police vehicle pulled up next to him. Three men in olive green uniforms forced him into the car and drove off. Like countless others lost to the void of the Chinese Cultural Revolution, he was never seen again. Liyi's story, however, would undulate, like ripples created by a small pebble, eventually washing onto the shores of the United States.

Psychiatric illness has always had an uneasy relationship with social acceptance, especially in East Asia. Early attempts to understand psychiatric illness elucidated it as a manifestation of supernatural phenomena. Hallucinations were seen as evidence of clairvoyance, depression was the result of hexes, and mania was the consequence of spiritual possession by "jinns," the accumulation of bad karma due to prior misdeeds. In East Asia, reflected shame—shame that is brought on one's family and community and known as "loss of face"'—is especially relevant. The diagnosis of mental illness can damage one's reputation among one's family and community to a life-altering degree. In traditionally collectivist communities with heavy emphasis on family structure, individual identity often derives from group membership (1). If stigma harms the affected individual's in-group status, then that person's identity is adversely affected. In terms of practical considerations, many individuals do not seek help because of the traditional customs of arranged or introduced marriages, where mental illness can be a red flag in one's eligibility for marriage. In addition, it can severely damage one's prospects of attaining desirable employment (2). In a culture where work represents the opportunity to demonstrate moral cultivation by repaying kinship obligations, the likelihood of employment instability is especially devastating (3).

The stigma of mental illness in China reached its zenith during the Cultural Revolution, from 1966 to 1976, when Western influence was seen as an insidious force that fomented counterrevolutionary ideas and corrupted the population. The educated elite, including many physicians, were seen as the vanguard of Western liberalism and were publicly shamed as being foreign agents or enemies of the people. Psychiatrists were no exception. In the province of Canton, there were 64 psychiatrists before the Cultural Revolution; 53 of them died by suicide during the Cultural Revolution. Those who remained were subsequently tortured or sent away to far-flung provinces for "re-education through labor" (4). Even though Zheng Liyi may not have known it, his fate was sealed the moment he swore the Hippocratic Oath.

The Cultural Revolution left an indelible mark on the field of mental health. A national survey of mental illness has not been performed in China since 1993; however, the number of practicing psychiatrists can be instructive. In 2018, there were an estimated 30,500 licensed psychiatrists in China, or 2.2 psychiatrists per 100,000 people (5). This is in stark contrast to the Western nations, such as France and the United States, where the numbers of psychiatrists per 100,000 people are 20.9 and 10.5, respectively (6).

Estimations of the true number of mentally ill patients in China vary widely. Per the Chinese National Health and Family Planning Commission in 2014, only 4.3 million people were registered as having a diagnosed mental illness. In a nation of 1.38 billion people, it strains credulity that only 0.31% of the population has a psychiatric disorder. Another source has estimated that 173 million people in China have a mental illness (7). In 2005, a survey sponsored by a nongovernmental organization found that in a random sample of 63,000 people, 16% had a mood disorder, which is on par with the prevalence of mood disorders in Western nations (8). The need for psychiatric care is as urgent in China as elsewhere, but the means to provide adequate care is lacking. In fact, many people seek help outside the formal, government-funded mental health system, via folk healers who use herbal or animal-product remedies, breathing exercises, and acupuncture (8, 9).

There are stirrings of hope for better mental health care in China. After the devastation wrought by the policies of the 1960s and 1970s, some cities have taken promising steps to address the need for psychiatric treatment. Grassroots-level change has been spearheaded by mental health professionals to provide inpatient services, case management, and home visits and to create neighborhood committees to offer social support (10). Community volunteers are trained in patient outreach to introduce themselves to community members who have a history of mental illness, defusing potential conflicts without use of violence. This system facilitates the treatment of acute illness and comprehensive monitoring of patient progress, as well as rehabilitation and prevention of long-term hospitaliza-

tions. One such program, known as the 686 Project, has registered 1.83 million patients, with follow-up rates of 88.7% (11). The only concrete measure available concerns violent events, with a 73.6% reduction among patients in the program.

A decade passed before Zheng Liyi's family learned of his fate. He passed away in a gulag on the western frontiers of China, leaving behind a widow and a daughter 11 years of age. The experience left an indelible imprint on the psyche of this young girl, who later emigrated from China to the United States in search of the peace and stability that was so elusive during her formative years.

REFLECTION FROM DR. GU

After my first day as a hospital volunteer during college, I called my grandmother to tell her of my passion for medicine. As I told her of my decision to become a physician, I could hear the emotion in her voice. "You remind me so much of him, you know. Your smile, your stride, your stubbornness, your sly sense of humor." Her voice was breaking as she told me how my grandfather was a psychiatrist in China before the Cultural Revolution. She told me that, as one of the few psychiatrists in China at the time, he trained in Russia as a young man to care for patients suffering from mental illness and that his name was Zheng Liyi. My family had kept this hidden from me because of the profound scar that my grandfather's passing left on our family. Even my grandmother, who was a pediatrician, could not escape the deep shame that resulted from decades of social and political indoctrination against psychiatric illness and those who provide care to the most vulnerable. Dante once said that fate cannot be taken from us, that it is a gift. Yet in this case, it seems that fate is not without a sense of tragic irony, in that I would carry on this family legacy.

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CASE REPORT

Intravenous Ketamine as a Treatment Option for Patients Presenting to the ED With Suicidal Ideation

Nicolas R. Genovese, M.D., Christopher W. Racine, M.D., Lee A. Wolfrum, D.O.

Suicide is the 10th leading cause of death in the United States and the second leading cause of death among individuals ages 10 to 34 (1). Moreover, the rate of annual emergency department (ED) visits in the United States related to suicidal thoughts has nearly doubled over the last few years, with an annual average of 1.5 such visits per 1,000 ED visits (2, 3). Inpatient hospitalization, a key tool in the treatment of patients with suicidal behaviors, is a service that is in high demand, with inadequate supply (4, 5). Moreover, psychotropic medications, psychotherapy, and psychosocial interventions can take weeks or longer before they are effective. Thus inpatient psychiatric hospitalization is often necessary to allow these treatments time to have an effect.

Intravenous ketamine has been shown to produce a rapid reduction in suicidal thinking among some depressed patients after a single infusion, with peak effects coming hours after administration and persisting for up to a week, as assessed by clinician-administered measures (6). Additionally, research suggests that this effect may be independent of improvement in depressive symptoms (6). Ketamine has also been shown to be an emerging treatment option for some patients who present to the ED with suicidal thoughts (7). In one study, patients given ketamine infusions had significant decreases in Beck Scale for Suicide Ideation scores 90–180 minutes after infusion, with less robust but still present decreases 14 days after administration (7).

With the ongoing shortage of inpatient psychiatric beds in the United States, intravenous ketamine infusion may represent a potential treatment option for reducing the risk of attempted or completed suicide among patients who present to hospital EDs. Here, we present the case of a young man who came to the ED with suicidal ideation and a plan to harm himself. A single ketamine infusion was administered in the ED, after which the patient experienced a resolution of suicidal thoughts and was referred for rapid outpatient mental health follow-up treatment. This case report presents a model for the potential utilization of intravenous ketamine infusions for patients who present to the ED with depression and suicidal thinking. The patient consented to the publication of this case report. Identifying information has been omitted or otherwise altered to preserve confidentiality.

CASE

Mr. B was a 33-year-old male with a psychiatric history of depression, anxiety, and attention-deficit hyperactivity disorder who presented to the ED with increased depression and a plan to complete suicide. His medications included daily doses of escitalopram 20 mg, lisdexamfetamine 40 mg, and hydroxyzine 25 mg. During the initial psychiatric evaluation, pertinent history included no past inpatient psychiatric hospitalizations, multiple failed antidepressant trials, a family history of depression, no history of suicide attempts, and no access to firearms. Additionally, the patient reported that he had a history of cannabis, cocaine, alcohol, and hallucinogen use. Notably, for 6 months prior to ED presentation he had abstained from all substances.

Mr. B reported a 6-week progressive worsening of his depressive symptoms and development of suicidal thoughts. His thoughts of suicide included a plan for asphyxiation via helium, and prior to presentation he had gone to a local store to acquire the items needed to complete his plan. Mr. B became distressed by these thoughts and reached out to a friend for help.

On the basis of medical and psychiatric evaluations, it was determined that Mr. B had treatment-refractory depression, having failed multiple antidepressant trials. Treatment with intravenous ketamine was discussed, and the patient gave informed consent. Mr. B had no history of previous ketamine or esketamine use. Per protocol, a single intravenous infusion of ketamine at 0.5 mg per kg was administered over 40 minutes. After the treatment, Mr. B self-reported significant improvement in his depressive symptoms and resolution of suicidal ideation, and after a period of observation, he requested discharge. At this time, safety planning and coordination with the patient's roommate were completed. Mr. B was discharged home, instructed to follow up with a psychiatrist for an intake within 48 hours, and provided with criteria to seek emergency mental health care should his suicidal thoughts return.

Mr. B attended his intake appointment as scheduled and reported sustained improvement of his depression and an absence of suicidal ideation. On day 4 postinfusion, in accordance with his safety plan, Mr. B called his psychiatrist to report an increase in depressive symptoms with passive suicidal ideation. He reported that his depression was less severe than preinfusion levels and that he did not have a plan or an intent to attempt suicide. He met with his psychiatrist as scheduled the next week, at which time he continued to report depression but no plan or intent related to his suicidal ideation. Over the next few months, Mr. B established care with an outpatient psychotherapist and overall

reported improvement. He remained off psychotropic medications, with the exception of the above-noted stimulant, for several months before reinitiating and stabilizing on his previous regimen of escitalopram 20 mg. He did not require inpatient psychiatric hospitalization and continued to engage actively in outpatient treatment.

KEY POINTS/CLINICAL PEARLS

- Intravenous ketamine has been shown to produce a rapid reduction of suicidal thinking among some patients with treatment-refractory depression after a single infusion.
- Decreases in suicidal ideation and depressive symptoms may occur rapidly and have been shown to persist, albeit less robustly, up to 14 days after administration.
- Utilization of intravenous ketamine as a therapeutic option in the emergency department may be a viable treatment option for some patients when combined with intensive safety planning and outpatient mental health treatment.

DISCUSSION

ED administration of intravenous ketamine infusions could emerge as an important treatment tool for a select group of patients with suicidal thoughts and behaviors for whom traditional treatment options may not be available. The proposed protocol utilized in this case was based largely on the administration methods used in research published by the Yale New Haven Psychiatric Hospital and may represent a standard dosing regimen for therapeutic ketamine infusions (8). Ketamine offers several potential advantages over traditional treatment options and has a favorable pharmacological safety profile. Its potential benefits include a rapid reduction in depressive symptoms and suicidal thoughts, the potential to avoid unnecessary inpatient psychiatric hospitalization, and decreased utilization of EDs as holding areas for patients awaiting improvement in their symptoms or inpatient hospitalization. Careful patient selection, close monitoring, and strict exclusionary criteria improve the safety profile of this medication. Hypertension, substance use disorders, current psychotic symptoms, pregnancy, and comorbid medical illnesses are frequently used as exclusion criteria in ketamine research. These conditions should be considered as possible contraindications for treatment to help improve the safety profile (8–10). In this case, Mr. B's history of substance use disorder was considered, because active substance use is an exclusionary criterion in the protocol utilized. However, because the patient had no substance use within the past 6 months, his substance use disorder was classified as "in early remission." Additionally, there is emerging evidence that therapeutic ketamine doses have low addictive—and potential antiaddictive—properties (11). Furthermore, ketamine's S-enantiomer, esketamine, which is approved by the Food and Drug Administration for treatment-resistant depression and major depressive disorder with suicidal ideation, does not carry an absolute contraindication of substance use disorder. Given these considerations, after a careful risk-benefit analysis, we determined that there was an appreciably greater risk of self-harm without ketamine administration, compared with the risk of relapse with ketamine; thus we elected to proceed with the treatment.

This case report highlights a novel treatment approach of an ED infusion of a subanesthetic dose of ketamine for suicidal thinking, with a robust and comprehensive plan for transition to outpatient mental health treatment. Although many patients experience improvement in depressive symptoms and suicidal thoughts following ketamine infusion, the duration of this effect appears to vary among individual patients (6, 8). Moreover, to our knowledge, none of the available literature has measured rates of attempted or completed suicide following ketamine infusions. In the aforementioned protocol, rapid patient connection to outpatient treatment is considered an essential safety measure, given the uncertainty around the timing of symptom relief in suicidal thinking and the possibility of self-harm. Additionally, the authors of the protocol proposed monitoring for adverse reactions to ketamine or nonresponse for a minimum of 2 hours from the start of a ketamine infusion to assess response.

When considering possible discharge for a patient who presents with suicidal thinking, special attention should be paid to safety planning and a thorough assessment of both risk factors for self-harm (e.g., previous suicide attempts, access to firearms, preparatory behavior, and acute psychosocial stressors) and mitigation strategies to reduce this risk. In the case of Mr. B, discharge presented an appreciable risk, which made the aforementioned strategies a critical part of a safe discharge plan. This was illustrated when his connection to an outpatient treatment provider and his ability to utilize previously discussed safety planning allowed him to seek out assistance when depression with passive suicidal thoughts returned 4 days after his ketamine infusion.

Although this case represents a successful implementation of this protocol, future research is needed to determine whether a single ketamine infusion is an effective and safe intervention for patients who present to the ED with depression and suicidal ideation. Additional research is needed into the duration and quality of the reduction in suicidal thinking that has been attributed to ketamine.

Dr. Genovese is a third-year resident and Drs. Racine and Wolfrum are attending psychiatrists in the Department of Psychiatry, Maine Medical Center, Portland.

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CASE REPORT

Suicidal Ideation on Day of Discharge

Alison Mause, B.S., and Samuel Warn, M.D.

Major depressive disorder (MDD) is one of the most prevalent psychiatric disorders in the adolescent population (1). Treatment for MDD is multidisciplinary and includes elements of psychoeducation, supportive management, psychotherapy, family involvement, school involvement, and pharmacotherapy (2). Furthermore, treating comorbid conditions in MDD is essential, because they can influence the ability to achieve complete response (2). Comorbid conditions can increase the risk of suicide and functional impairment for patients with MDD (2). Comorbid factitious disorder (FD) can be a barrier to proper treatment and safe discharge planning (3).

FD is a psychiatric condition in which patients deliberately produce or falsify signs and symptoms of an illness. Patients are motivated by internal factors, such as the psychological drive for attention, rather than external factors, such as financial gain (4). Despite growing evidence of FD among pediatric patients, it remains underdiagnosed and misunderstood. A 2008 article by Ehrlich et al. (5) cited the prevalence of FD as 0.7% among pediatric patients. Given the rarity of FD, much of the research is focused on adult populations. Moreover, even the limited research on pediatric FD focuses primarily on presentations with physical rather than psychiatric symptoms (5).

In this case, we add to the literature on pediatric presentations of FD by describing a case report of an adolescent who reported suicidal ideation despite her readiness for discharge. Some details have been altered to protect patient confidentiality, but key points of the case have been preserved. Consent was obtained from the patient's guardian.

CASE

A 14-year-old female with a history of recurrent MDD, posttraumatic stress disorder, and generalized anxiety disorder was admitted to the inpatient psychiatric unit for suicidal ideation. Before admission, the patient had more than five previous inpatient psychiatric admissions and two prior suicide attempts: one by overdose and another by cutting her wrists in front of her mother. She was recently at a residential treatment center for 6 months because of poor functioning at home and school. After her stay at the residential center, she went home with her grandparents. She normally lived with her parents; however, the relationship was strained and likely contributed to her symptoms. One month after discharge, she ran away after an argument with her grandmother. The same day, she was found near a bridge with intention to jump and was brought to the hospital.

On admission, the patient endorsed depressive symptoms and active thoughts of suicide. She was engaging in nonsuicidal self-injury during and prior to admission by cutting and burning her arms. The patient reported that a trigger for suicidal ideation was an upcoming forensic interview regarding a sexual assault. She reported a variety of trauma-related symptoms and ongoing, daily generalized anxiety. She endorsed nonspecific auditory hallucinations, which were suspected to be negative self-talk and flashbacks, rather than psychosis.

During her inpatient stay, the patient underwent individualized therapy and medication adjustments. Sertraline and quetiapine were past medications and were restarted. Prazosin was started for trauma-related nightmares. The patient was initially engaged in programming and sociable with peers. During the first 3 days of admission, her anxiety and depression consistently improved. The patient denied suicidal ideation, and discharge planning began. However, after a call with her guardian, the patient again reported suicidal ideation to staff and then refused to speak to the treatment team. This pattern repeated each time she had a phone conference or pending discharge over the next 2 weeks. Discussion with the patient's mother revealed that a similar pattern had occurred during her stay in the residential treatment center. The team began to suspect a factitious element to this patient's suicidality.

Throughout the patient's admission, she gradually became less cooperative with the psychiatric team and disinterested in unit programming. She remained highly social with peers. After multiple team discussions, she was placed on individual programming aimed to reduce peer distraction and encourage focus on treatment. The patient gradually opened up to the unit therapist. Her anxiety and negative self-image had been driving her suicidal ideation and nonsuicidal self-injury, which were exacerbated by tension with her grandmother rather than the forensic interview alone. The team scheduled mediated calls with her grandmother to address communication. After multiple days of sustained improvement, the patient was informed of discharge only after her family arrived on the final day. The patient was discharged home and has not had a repeat psychiatric admission in more than a year since discharge.

DISCUSSION

This case raises various complex topics, but the discussion focuses on factitious elements. Despite readiness for discharge, patients may refuse to leave the hospital for multiple reasons. When a patient wishes to stay against medical advice to obtain an obvious secondary gain, malingering can be diagnosed (3). Malingering is the feigning or gross exaggeration of a physical or psychological symptom for external gain (such as financial reward) (3). FD can be diag-

TABLE 1. Reasons patients may desire to remain in the hospital against medical advice and associated diagnoses

Reason or motivation to stay	Associated diagnosis	Description
Primary gain: a desire to play the sick role in the hospital; no obvious external gain	Factitious disorder imposed on self	Psychiatric condition in which patients deliberately produce or falsify signs and symptoms of illness (4)
Secondary gain: to obtain meals, shelter, financial benefits, or attention; to avoid legal problems; or to obtain medications; obvious external gain	Malingering	Patient feigns or grossly exaggerates a physical or psychological symptom for external (secondary) gain (3)
Patient disagrees with the opinion of the medical team: attempt to stay longer until a better solution to the patient's problems can be identified and applied	Functional neurological disorder (conversion disorder)	Psychiatric condition in which a particular symptom affects motor or sensory functioning, causing significant distress or deficit to normal everyday functioning, with no organic cause, and the symptom cannot explained by another psychological or physiological condition (6)
Fear of leaving the hospital: feeling of safety while in the hospital; overwhelmed and incapable of functioning outside the hospital	Somatic symptom disorder	Psychiatric condition in which one or more somatic symptoms are associated with excessive worry, which causes a loss of opportunity in personal and social life (7)

nosed when the patient's motivation is a primary gain (with no obvious external gain) (3). FD imposed on self is an intentional falsification of illness, including feigning illness, self-induced illness, or exacerbation of preexisting illness, motivated by internal factors. In both malingering and FD, patients are conscious of their intention to deceive (3). When the motivation to stay is unconscious, then somatic symptom disorder or conversion disorder is more likely (6, 7). Table 1 summarizes some of the most common reasons that patients may desire to remain in the hospital (3, 4, 6, 7).

When factitious elements are suspected, the patient should not be immediately confronted. Such interaction can damage the therapeutic alliance (8, 9). FD is often secondary to another emotional disorder, and treatment of that psychopathology can help decrease factitious behaviors (8). Early recognition of factious elements is important to prevent unnecessary and invasive procedures and expenses (10). Accurate diagnosis is also important. A retrospective study by Krahn et al. (9) showed that physicians are reluctant to include FD in the differential diagnosis without definitive proof. The lack of an appropriate diagnosis is detrimental to the patient, because suspicion of fabrication of illness can lead to countertransference that interferes with compassionate medical care (9). Treatment involves connecting with patients empathetically and helping them act out their distress in a healthy manner (10).

The patient's treatment and discharge are complicated when the patient feigns thoughts about and plans for suicide in an attempt to remain hospitalized against medical advice (3). Strategies for the physician in such cases include first determining the patient's gain and then attempting to make the patient aware of his or her motivations (3). Knowing what the patient's motivations are allows the physician to discuss the reasons for staying in a nonjudgmental manner, with a focus on finding alternate ways to meet the patient's needs outside the hospital (3).

For the patient described here, the treatment approach for factitious elements included empathetic listening, unconditional acceptance, and attempts to help the patient act out distress in a healthy manner. With such an extended residential stay and prior assault, the patient was reluctant to return to school and normal life. To encourage the patient to connect with peers and family outside the hospital rather than relying on support from the inpatient unit, the patient's treatment plan focused on individual programming. An additional barrier arose when the patient reported difficulties creating a safety plan at the family home. She participated in family therapy with her grandmother and slowly built confidence to develop a reasonable safety plan.

According to Moran et al. (3), forming the discharge plan for a patient with factitious elements of disease includes three stages: planning, the encounter, and follow-up. The planning phase involves a multidisciplinary team with doctors, nurses, social workers, legal guardians, and security officers (3). The medical team may refrain from telling the patient about discharge until the encounter phase—when the patient is informed of impending discharge. During this phase, the physician should use empathy and compassion to inform the patient. If the patient is agitated or threatens staff, security may need to intervene (3). In the follow-up phase, documentation is critical for discharge, including any further factitious behaviors, as is follow-up with an outpatient provider (3).

As described by Moran et al. (3), discharge for this patient first involved a planning stage to contact the patient's extended family, followed by improved symptomatology and close collaboration with social workers to ensure a safe home environment (3). The encounter phase for this patient had to occur multi-

KEY POINTS/CLINICAL PEARLS

- Factitious disorder is a condition in which patients deliberately falsify illness, motivated by internal gain (to play the sick role).
- Malingering should be diagnosed when patients' deliberate falsification of illness is motivated by external gain (e.g., financial).
- Clinicians should identify the motivation for factitious elements of disease and attempt to meet those needs outside the hospital.

ple times, but the treatment team aimed to inform the patient of discharge with the utmost empathy and compassion. Eventually, the encounter phase had to occur very close to the time of discharge. The follow-up phase involved careful documentation of the patient's discharge process and a careful outpatient care plan formed in collaboration with the patient and family.

CONCLUSIONS

Adolescents with recurrent MDD and factitious elements require special consideration for both treatment and discharge. These patients require a multidisciplinary approach. Difficult financial situations, a challenging home life, and lack of social connection outside the hospital can be barriers to discharge. Clinicians should attempt to understand a patient's motivations for staying hospitalized. Discharge of patients with factitious elements requires exceptional compassion and support during all three phases of discharge—planning, encounter, and follow-up. Care teams may need to perform multiple or abrupt encounter phases while preparing for safe discharge. Finally, successful discharge relies on appropriate maintenance treatment with follow-up psychotherapy and medication management.

Ms. Mause is a fourth-year medical student and Dr. Warn is a third-year psychiatry resident at Creighton University, Omaha.

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CASE REPORT

A Case of Pneumocephalus, Neurocognitive Decline, and Psychosis

Ernest Okwuonu, M.D., Brenda Marmol, M.D., Rachel Earle, M.P.H.

Pneumocephalus, also known as pneumatocele or intracranial aerocele, is the presence of air in the intracranial space. The most frequent cause is trauma, but there are many other etiological factors, such as surgical procedures, iatrogenic causes, and tumors (1). A vast majority of cases present asymptomatically; however, symptoms can include nausea, vomiting, confusion, dizziness, seizures, and rare cases of cranial nerve palsy, delirium, and cognitive impairment (2).

The management of pneumocephalus is usually conservative: elevation of the head and abstinence from maneuvers that cause an increase in intrasinus pressure, such as sneezing, coughing, and the Valsalva maneuver. Pneumocephalus usually resolves after 1 week, and surgical intervention is not required unless complications arise (3).

To our knowledge, there has been no known reported case of cognitive impairment and psychosis due to the presence of pneumocephalus, as reported in this case presentation. This case illustrates the unusual neuropsychiatric sequelae after various neurosurgical interventions.

CASE

Mr. B is a 67-year-old Caucasian male with a history of hypertension, hyperlipidemia, asymptomatic atrial fibrillation, diabetes mellitus type II (non–insulin dependent), and chronic back pain. Of note, he had a pertinent surgical history of intrathecal morphine pump placement 3 months before the acute presentation to manage chronic back pain and then removal due to infection approximately 4 weeks before presentation. His psychiatric, social, and family history were noncontributory to the acute presentation.

Mr. B presented to the hospital via ambulance, with a 1-week history of confusion, agitation, and transient psychosis. On presentation, he was alert and oriented to person and place only, with a minimal recollection of the events that brought him to the hospital. He stated, "That nurse is part of the FBI and is here to take me in." Delirium was suspected; however, there were no fluctuations in mentation noted. As per collateral information, 3 weeks prior to the presentation, he lived independently and performed activities of daily living.

Mr. B's vital signs, hematologic and biochemical panels, urinalysis, and urine toxicology were within normal limits. The physical exam was unremarkable. High-resolution computerized tomography (CT) of the brain showed multiple areas of intraparenchymal pneumocephalus, with air recognized within the ventricular system bilaterally, the circle of Willis, left frontal lobe, interhemispheric fissure, and temporal fossa bilaterally (Figure 1). In comparison, a brain CT obtained postsurgery was unremarkable.

Mr. B was admitted to the medical service for further management and resumed home medications. The psychiatric consultation-liaison team was requested to manage ongoing psychosis and behavioral disturbances. On further assessment, he underwent the Montreal Cognitive Assessment (MoCA) and scored a 12/30, suggestive of severe neurologic deficits in executive functioning, working memory, and recall (4). Additionally, he continued to display new-onset paranoid delusions, which included, but were not limited to, accusing hospital staff of being part of law enforcement.

New-onset psychosis was managed with divalproex sodium (delayed-release) 250 mg by mouth twice daily and haloperidol 5 mg by mouth at bedtime. This combination was started to address irritability, agitation, and delusions. Divalproex level on day 3 was 30.3 mcg per ml. The patient was monitored with serial MoCA assessments throughout hospitalization, which continued to reflect severe neurologic deficits in executive functioning, working memory, and recall, with no significant improvement (4). One month later, a repeat brain CT showed persistent pneumocephalus, with the continued presence of cognitive deficits. However, the psychosis and mood symptoms, which included paranoid delusions and irritability, were well managed with the continuation of the haloperidol and divalproex regimen. The patient was unfortunately lost to follow-up after discharge.

DISCUSSION

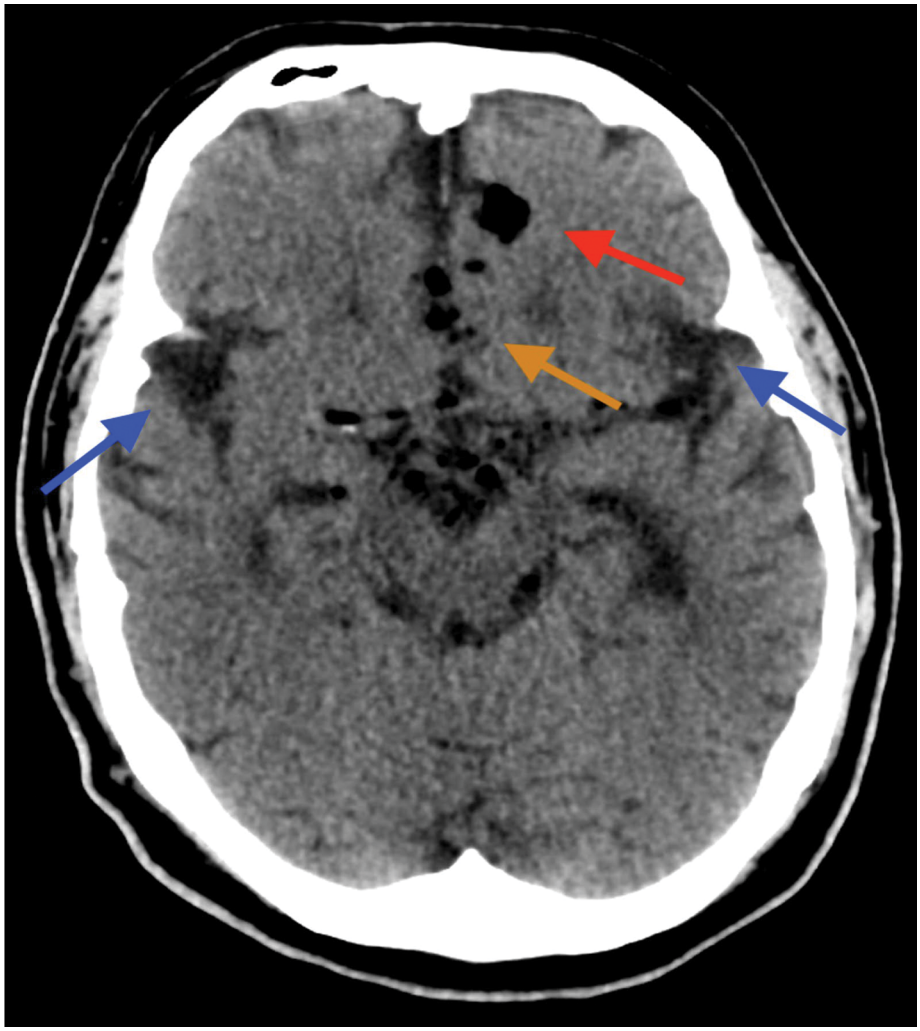
The etiology of new-onset psychosis with cognitive impairment can be related to several factors, including illicit substances, general medication sequelae, and primary psychiatric illness. Mr. B's medication regimen was thoroughly reviewed for possible neuropsychiatric side effects but was unremarkable. Medications commonly associated with psychiatric side effects include isotretinoin, interferons, corticosteroids, metronidazole, anabolic steroids, and beta-blockers (5). In addition, other known causes of neurocognitive disorders, such as vascular dementia, Alzheimer's dementia, Lewy body dementia, frontotemporal dementia, and encephalitis (6), were considered but did not fit his clinical presentation. Dementia usually presents as chronic and gradual as opposed to the rapid decline with an inciting event noted in this presentation.

On initial review of his medical records and examination, we suspected that the psychiatric symptoms and neuroimaging findings could be due to neurosurgical complications from the placement and removal of the morphine pump. Comprehensive studies have reported that complications of intrathecal pumps can be categorized into mechanical, surgical, and medical. Medical complications include edema and infections, most notably methicillin-resistant *Staphylococcus aureus* (7). Surgical complications include neurological injury, cerebral spinal leaks, and malpositioned subcutaneous pockets. Neurological complications that can arise from intrathecal morphine pump placement and removal include spinal cord injuries, myelopathies, and dysesthesias' damage to nerve roots resulting in pain, sensory loss, or weakness (8). Other rare complications include intraparenchymal injury and progressive necrotic myelopathy in a reported case. Neuropsychiatric complications can occur later, as evident in this case presentation of pneumocephalus after a week (9). Therefore, clinicians should obtain serial head and spinal CT or MRI scans to check for neurological or psychiatric sequelae.

Mr. B had episodes of agitation throughout hospitalization. Several case reports have suggested that agitation can occur in some patients with pneumocephalus, especially if present in the frontal lobe region. A prospective cohort study indicated that bifrontal pneumocephalus was an independent risk factor for postoperative agitation. The frontal lobe involves emotion and cognition; air in this region may result in abrupt changes in behavior, including agitation. This hypothesis requires further research, because it is only a presumptive mechanism (10). New-onset psychosis and agitation were managed effectively with divalproex and haloperidol. Extensive studies have shown that haloperidol can treat acute psychosis and has proven efficacy for agitation. However, studies have shown that a combination of divalproex and an antipsychotic produce quicker initial resolution of psychotic symptoms, compared with monotherapy (11).

Unfortunately, the patient's severe cognitive impairment showed no improvement, and there were concerns about the long-term ramifications. Cognitive dysfunction is usually associated with morphological changes within the cortex. A study found that aging, combined with lesions to the frontal lobe, affects the ability to complete executive tasks (6). Compared with healthy controls, patients with frontal lesions performed poorer on tests of executive functions (12). In addition, lesions in the temporal lobe would likely present with dementia-like symptoms affecting memory. Studies in Alzheimer's groups found that reduced connectivity networks in the temporal lobes and the subcortical regions were associated with rapid memory decline, poor memory performance, and emotional dysregulation (13).

FIGURE 1: Axial computerized tomography of the brain showing extensive pneumocephalus within the ventricular system bilaterally, the circle of Willis, left frontal lobe (red arrow), interhemispheric fissure (gold), and temporal fossa bilaterally (blue)



Furthermore, the location of the pneumocephalus could also have another random effect on the brain morphology, disrupting the dopamine pathways that transcend the prefrontal cortex and midbrain. This effect is illustrated clinically with the presence of new-onset psychotic symptoms (14). However, these are speculative mechanisms and require further investigation.

We believe that neurocognitive decline and psychosis were secondary to pneumocephalus in this case (Figure 1). The most likely etiology was iatrogenic, resulting from the placement and removal of the epidural morphine pump for back pain management. Although an overwhelming majority of pneumocephalus resolves within a week, if symptoms persist, we speculate that pneumoceph-

KEY POINTS/CLINICAL PEARLS

- Pneumocephalus can present with cognitive impairment and new-onset psychosis.
- Psychiatrists should obtain neuroimaging studies when patients present with new-onset psychosis and cognitive impairment, especially after neurosurgical procedures.
- Although most pneumocephalus cases resolve, if they persist over an extended period, serial cognitive assessments would be prudent.

alus can cause transient psychosis and contribute to long-term cognitive impairment, which may be irreversible, as in this presentation (2).

A limitation is that no presurgical formal testing was available for comparison. We recommend that psychiatrists and primary care providers obtain neurological imaging or serial cognitive assessments after neurosurgical interventions, especially when psychosis or sudden cognitive impairments are apparent.

CONCLUSIONS

The combination of pneumocephalus, cognitive impairment, and new-onset psychosis is exceedingly rare. To our knowledge, this is the only case report that indicates such a presentation. Sudden cognitive deterioration is undoubtedly an ominous sign, and if not resolved quickly, pneumocephalus can have long-lasting deleterious effects on the quality of life. Besides the presence of air causing an effect within the brain parenchyma, one needs to consider whether an inflammatory process is present. It is unclear how pneumocephalus alters the brain morphology or has an overall impact that leads to this clinical presentation. In this case, the diffuse nature of the pneumocephalus and the involvement of the frontal lobe, temporal lobe, and interhemispheric fissure were associated with alterations in the patient's behavior and cognitive function.

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The authors have confirmed that details of the case have been disguised to protect patient privacy.

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ARTS AND CULTURE

A Tribute to the Mind

Margaret Y. Yau, M.S.

The Mind
an emergent property
of the most complex organ
of all living beings—the brain,
billions of neurons firing, firing;
electrical impulses vrooming, vrooming;
chemical messengers drift across
trillions of nanoscale connections—
empowers all that makes us human:

Emotions
vary as the vibrant colors of a transient rainbow—
Ire, fear, joy, grief, surprise, disgust, contempt—
rays of laughter, raindrops of sorrow,
tides of anxiety ebb and flow.
Who could forecast one's fickle moods,
or calm these undulating waves,
or stop the howling wind
even before they all begin?

Thoughts
positive or negative, bring
cheerful smiles or desolate tears.
Conscious quests for innovation
spark flashes of insights;
subconscious insecurities
spawn palpable apprehension.
Twisted, convoluted delusions detach one
from reality, seeing, hearing, feeling
non-existent entities materialized within
an ostensibly harmonious universe.
Who could decipher the brain's perplexing language,
the mind's dominating power over
our perception of reality and surreality,
sieving through entangled webs of intangible abstraction?

Actions
seemingly simple as a
blink of an eye, flick of a finger,
or endlessly enchanting as
elegant arabesques, intricate somersaults,
virtuoso performances, driven by
symphonies of interacting neurons.
Acts of kindness engender warmth
that enlivens the entire atmosphere;
acts of violence induce darkness
that permeates the sweetest dreams,
cast ponderous shadows of dread
that constant vigilance cannot lift.
Who could imagine that a single organ
of white and gray can impact so much,
enable emotions, thoughts, and
actions that define one's destiny,
let alone shape the future of the universe?
Who will tackle the disorders of the mind,
empathetically listen and observe
its workings hour after hour,
unlocking the link between
the tangible and the intangible?

Ms. Yau is a fourth-year medical student in the School of Medicine, University of California, Riverside.

The author thanks all psychiatrists for their inspiration.

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