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CASE REPORT / OLGU SUNUMU

# Hyperactive Delirium and Short-Term Quetiapine Treatment: A Pediatric Case

## Hiperaktif Deliryum ve Kısa Dönem Ketiapin Tedavisi: Bir Pediatrik Vaka

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**Abstract:**

Pediatric delirium is an acute neuropsychiatric syndrome that differs from adult presentations and is often underrecognized in clinical settings. In children and adolescents, delirium may develop due to various etiological factors such as drug or substance toxicity, infections, autoimmune or neurological disorders, trauma, metabolic abnormalities, or multiorgan failure. Recognition during childhood is challenging because symptoms vary by age, communication may be restricted, and physical illnesses often mask psychiatric findings. This case report aims to examine the effectiveness of quetiapine in the presentation of hyperactive delirium in a 17-year-old male patient after surgical intervention, in which multiple factors played a role. Postoperatively, the patient received midazolam (265 mg/day for 3 days) and morphine (27 mg/day for 1 day). At consultation, ongoing treatments included piperacillin/tazobactam, teicoplanin, terlipressin, morphine, vitamin K1, and intravenous hydration. Laboratory results showed hyponatremia (Na: 130 mmol/L) and elevated C-reactive protein (CRP: 225 mg/L). The initial Delirium Rating Scale score was 23, and quetiapine 25 mg/day was started with the option to increase to 50 mg/day. After treatment initiation and correction of underlying factors, the score decreased to 6 at one-week follow-up, showing marked and significant improvement. This case suggests that short-term, low-dose quetiapine can be an effective, safe, and well-tolerated option for hyperactive delirium associated with hyponatremia, inflammation, and sedative or analgesic exposure. Moreover, it highlights the crucial importance of greater awareness, early recognition, careful assessment of biological and iatrogenic factors, and coordinated multidisciplinary collaboration for effective clinical management in pediatric delirium.

**Keywords:** Delirium, Quetiapine, Pediatric patients.

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**Öz:**

Pediyatrik deliryum, yetişkinlerden farklı klinik özelliklerle seyreden, sıklıkla tanınmayan akut bir nöropsikiyatrik sendromdur. Çocuk ve ergenlerde deliryum gelişimi; ilaç veya madde toksisitesi, enfeksiyonlar, otoimmün ve nörolojik hastalıklar, ciddi travmalar, metabolik bozukluklar ve çoklu organ yetmezliği gibi çok çeşitli etiyolojik nedenlerle ilişkili olabilmektedir. Deliryumun çocukluk çağında tanınmasını güçleştiren en önemli faktörler arasında, belirtilerin yaşa göre değişkenlik göstermesi, iletişim güçlükleri ve eşlik eden fiziksel hastalıkların klinik tabloyu maskelemesi yer almaktadır. Bu olgu sunumunun amacı, 17 yaşında erkek bir hastada cerrahi girişim sonrası çoklu etkenlerin birlikte rol aldığı hiperaktif deliryum tablosundaki ketiapinin etkinliğini incelemektir. Bu olgu sunumunda, cerrahi girişim sonrası gelişen özellikle hiperaktif deliryum tablosu ele alınmıştır. Ameliyat sonrası dönemde hastaya midazolam (265 mg/gün, 3 gün) ve morfin (27 mg/gün, 1 gün) uygulanmış, başvuru sırasında ise piperasilin/tazobaktam 16 mg/gün, teikoplanin 800 mg/gün, terlipressin 2 mg/gün, morfin 7.5 mg/gün, K1 vitamini 10 mg/gün ve intravenöz hidrasyon tedavisi aldığı belirlenmiştir. Laboratuvar incelemelerinde hiponatremi (Na:130 mmol/L) ve yüksek C-reaktif protein (CRP:225 mg/L) saptanmıştır. Deliryum Değerlendirme Ölçeği puanı ilk değerlendirmede 23 olup, hiperaktif deliryum tanısıyla ketiapin 25 mg/gün başlanmış ve dozun 50 mg/gün'e kadar artırılabileceği önerilmiştir. Tedaviye başlanması ve altta yatan etkenlerin düzeltilmesi sonrası bir hafta sonraki kontrol değerlendirmesinde Deliryum Değerlendirme Ölçek puanı 6'ya gerilemiştir. Bu olgu, hiponatremi, inflamatuvar yanıt ve sedatif/analjezik kullanımı sonrası gelişen hiperaktif deliryumda ketiapinin düşük doz kısa süreli kullanımının etkili ve güvenli bir seçenek olabileceğini göstermektedir. Ayrıca çocukluk çağında deliryumun erken tanınması, biyolojik ve iatrojenik etkenlerin dikkatle değerlendirilmesi ve uygun farmakolojik yaklaşımın multidisipliner iş birliğiyle yürütülmesinin önemini vurgulamaktadır.

**Anahtar Kelimeler:** Deliryum, Ketiapin, Pediatrik hastalar.

## Introduction

Delirium is an acute-onset neuropsychiatric syndrome characterized by decreased environmental awareness, attention disturbances, and fluctuating cognitive changes (Edition, 2013). Delirium is common among critically ill patients, and a study examining factors associated with pediatric delirium in the pediatric intensive care unit reported a prevalence rate of 42.1% (Kim et al., 2019). Although delirium is generally considered a transient complication of critical illness in both adult and pediatric intensive care unit patients, it appears to be associated with adverse outcomes such as increased mortality, length of hospital and ICU stays, duration of extubation, and medical costs (Barr et al., 2013; Traube et al., 2016).

Delirium is not limited to adults admitted to intensive care units; it is also common in critically ill children. In addition to patients monitored in the intensive care unit, certain pediatric populations outside of intensive care, such as children hospitalized with a cancer diagnosis, are also at risk for developing delirium (Stenkjaer et al., 2022). The estimated overall prevalence of delirium in children with chronic illnesses is 34%, with this rate varying between 17% and 66% depending on the subgroup evaluated (Semple et al., 2022). Furthermore, evidence suggests that delirium in critically ill children is associated with more extended hospital stays, higher mortality rates, cognitive decline after discharge, and increased costs (Dechnik & Traube, 2020; Ely et al., 2004; Pandharipande et al., 2013). Delirium has been linked to post-intensive care syndrome, physical problems, cognitive decline, and mental health outcomes such as anxiety, depression, and post-traumatic stress disorder within the year after discharge (Manning et al., 2018).

Hyperactive delirium can manifest in various psychomotor subtypes, including hyperactive, hypoactive, and mixed (Barr et al., 2013; Wilson et al., 2020). The hyperactive subtype is characterized by restlessness, agitated behavior, and/or aggression, while the hypoactive subtype is characterized by lethargy (or sluggishness) and decreased psychomotor activity; the mixed subtype is characterized by both hyperactive and hypoactive features (Bellelli, Brathwaite, & Mazzola, 2021). In children, the most commonly observed subtype is hyperactive delirium. Still, the diagnosis is often missed due to low awareness of hypoactive delirium and because this subtype can be confused with more common diagnoses such as depression (Grover et al., 2014; Hatherill & Flisher, 2010).

In a retrospective study examining the causes of delirium in pediatric cases, the most common reason was reported to be infection, followed by drugs/substances (benzodiazepines, cannabis, cocaine, dextromethorphan), autoimmune diseases, and organ/bone marrow transplantation (Turkel & Tavaré, 2003). Additionally, neurological diseases, infections, severe trauma, drug/substance effects, multiple organ failure, cardiac and respiratory diseases, autoimmune diseases, cancer, and bone marrow/organ transplants are listed as the most frequently reported causes in the literature (Hatherill & Flisher, 2010). Predisposing factors refer to those that are rarely or never changeable, specific to the patient and diseases, including young age and developmental status. Triggering factors include limited social interactions, immobility, sleep disturbances, sedation, and related factors that can be modified (Holly et al., 2018).

Among the organic causes leading to delirium, it is thought that various metabolic conditions primarily disrupt the balance between dopaminergic, cholinergic, and glutamatergic systems. It is proposed that this disruption triggers a common neuropathological process through the hypo- or hyperactivation of different neuronal pathways, resulting in the presentation of delirium (Smith et al., 2013). In cases where organic damage causes an excess of dopamine and a decrease in acetylcholine activity; a

'hyperactive delirium' pattern emerges, characterized by agitation, aggression, restlessness, emotional fluctuations, and psychotic symptoms, conversely, when there is a deficiency in dopamine along with increased activity of acetylcholine and GABA, a 'hypoactive delirium' develops, characterized by apathy, cognitive suppression, avolition, disconnection from the environment, and unresponsiveness to external stimuli (Maldonado, 2018).

The systemic inflammatory response is an important phenomenon in critical illnesses and can progress to organ dysfunction, including the brain. Systemic inflammation and endothelial activation frequently occur during critical diseases. They can increase cytokine transport across the blood-brain barrier (BBB), disrupt the blood-brain barrier, and promote infiltration of leukocytes and cytokines into the central nervous system (Alexander et al., 2008; Qin et al., 2007). These events can lead to ischemia and neuronal apoptosis, which may clinically manifest as delirium (Hughes, Patel, & Pandharipande, 2012). Studies have shown that serum procalcitonin and IL-6 concentrations are significantly higher within 24 hours in patients with delirium compared to those without (Ari, Kafa, & Kurt, 2006; Zhang, Sheng, & Yao, 2014). Critically, these studies demonstrate a relationship between the onset of delirium in critically ill patients—both infectious and non-infectious conditions—and circulating biomarkers. Another study found that, after adjusting for covariates, lower plasma concentrations of matrix metalloproteinase-9 (MMP-9) and protein C, along with higher concentrations of soluble tumor necrosis factor receptor-1 (sTNFR1), were associated with an increased risk of delirium (Zhang, Sheng, & Yao, 2014). A recent study linking the inflammation marker CRP to the incidence and severity of delirium highlights the role of systemic inflammation in its pathophysiology (Vasunilashorn et al., 2017).

Korevaar et al. have more frequently identified fluid and electrolyte imbalances in patients with delirium (Korevaar, van Munster, & de Rooij, 2005). The relationship with delirium is one of the electrolyte imbalances, and the most common is hyponatremia. It is observed in 15-20% of patients presenting to the emergency department and up to 30% of hospitalized patients (Spasovski et al., 2014). The role of sodium in neuronal function is well documented. Since hyponatremia can lead to cerebral edema and increased intracranial pressure, it has been suggested that this condition may potentially accelerate or exacerbate delirium (Jang et al., 2016). Aldemir et al. proposed that hyponatremia is an independent predictor of delirium (Aldemir et al., 2001).

Significant differences can be observed between children and adults in the clinical features of delirium. While the clinical presentation in older children may be similar to that of adults, developmental level can influence the clinical picture in young children. In young children, observation by the treatment team and information provided by caregivers can play a more important role in diagnosis (Stoddard, Usher, & Abrams, 2006). Restlessness, agitation, mood changes, sleep-wake cycle disturbances, attention deficits, and fluctuations in symptom severity have been reported as more common signs in children. In contrast, hallucinations, memory and speech disturbances, and psychomotor retardation have been reported as more prominent features in adult delirium. Apathy, anxiety, orientation disturbances, and other perceptual disturbances excluding delusions have been reported with similar frequency in both children and adult groups (Grover et al., 2012; Hatherill & Flisher, 2010).

In the treatment of delirium symptoms, opioids or benzodiazepines are most commonly used in intensive care units (Amirnovin et al., 2018). However, studies have shown that increased use of opioids or benzodiazepines contributes to delirium (Silver et al., 2015). Additionally, increasing sedation to treat delirium symptoms such as agitation and restlessness leads to longer sedation and hospital stays, thereby further increasing the risk of delirium. Consequently, the growing need for sedation and the higher risk of delirium create a vicious cycle (Thielen et al., 2024).

The primary treatment for delirium involves managing the underlying cause (e.g., acute critical illness) and preventing iatrogenic factors (e.g., polypharmacy, pain, sleep deprivation, immobility). However, some children require antipsychotic medication to manage delirium symptoms. Antipsychotic treatment can help reduce agitation, confusion, sleep-wake disturbances, and the duration of delirium symptoms (Turkel & Hanft, 2014). Psychiatric evaluation of agitated patients significantly contributes to identifying underlying medical causes. Behaviors such as aggression should be considered as potentially related to a medical disorder that needs treatment, and necessary investigations should be conducted to explore this possibility (Gülpek et al., 2019). There is very limited information about the most effective pharmacological treatment for delirium in children (Maldonado, 2008). While antipsychotics are frequently used in the treatment of adult delirium, evidence supporting their use in children is limited and consists mainly of small retrospective studies and case reports (Hatherill & Flisher, 2010; 2013; Turkel et al., 2012). Commonly used agents include haloperidol, risperidone, and quetiapine, but currently there are no antipsychotic medications approved by the Food and Drug Administration for treating delirium in adults or children (Silver et al., 2010). The common side effects of antipsychotic treatment include sedation, agitation, orthostatic hypotension, and anticholinergic effects (e.g., dry mouth and constipation). Less common but more serious side effects include electrocardiographic abnormalities such as QT interval prolongation and ventricular arrhythmias (torsades de pointes), extrapyramidal symptoms (EPS), seizures, and neuroleptic malignant syndrome (Turkel & Hanft, 2014). Therefore, to promote optimal and safe treatment of delirium, close monitoring for potential side effects (e.g., vital signs, neurological assessment, electrocardiogram [ECG], and laboratory analysis) and collaborative management involving pediatric subspecialists, including psychiatry and pharmacy, are recommended (Turkel & Hanft, 2014).

Most studies on the use of antipsychotics in the treatment of delirium have focused on haloperidol, and in clinical practice, risperidone, aripiprazole, olanzapine, quetiapine, and ziprasidone are commonly used other antipsychotics (Smith et al., 2013; Turkel & Hanft, 2014). In patients with a history of hyponatremia or increased risk of hyponatremia who require antipsychotics, second-generation antipsychotics, which are considered safer than first-generation antipsychotics, may be preferred. Hyponatremia resulting in hospitalization can occur at any

time after starting treatment with an antipsychotic medication. As a result, it is important to be vigilant for symptoms of hyponatremia, but systematic sodium monitoring is generally not recommended. However, sodium testing may be suggested in individuals whose psychiatric or somatic condition worsens while using antipsychotics (Holly et al., 2018).

Quetiapine is an atypical antipsychotic medication shown to be effective in the treatment of delirium in adults (Devlin et al., 2010). Quetiapine exhibits specific pharmacological properties that make it a potential candidate for the treatment of delirium. It has high affinity for serotonin, histamine, and alpha-1 adrenergic receptors, and low affinity for dopamine and M1 muscarinic receptors (Goldstein et al., 1993). The literature includes studies demonstrating the safe use of quetiapine in pediatric populations for the treatment of delirium (Traube et al., 2013). Atypical antipsychotics like quetiapine have been used to treat delirium with a more favorable safety profile compared to older antipsychotics, due to fewer neurological extrapyramidal effects and minimal QTc interval prolongation (Devlin et al., 2010; Joyce et al., 2015; Traube et al., 2013; Turkel et al., 2012). Additionally, a study evaluating the relationship between antipsychotic agents and cardiac outcomes found that quetiapine carries a significantly lower risk of cardiac death and ventricular arrhythmias compared to other typical and atypical antipsychotics (Leonard et al., 2013). Omura and colleagues showed that when 24-year-old patients diagnosed with delirium were treated with 25-50 mg of quetiapine, their delirium severity scores initially averaged 18.1 ± 3.7 and decreased to 8.9 ± 3.9 by the seventh day of treatment, indicating clinical improvement (Omura & Amano, 2003). A previous study in the pediatric age group demonstrated that, in patients followed for a median of 12 days and receiving an average daily dose of 1.3 mg/kg/day, the treatment was considered reliable (Joyce et al., 2015). The effectiveness of quetiapine in treating delirium has been primarily shown in critically ill adult patients, but further research is needed to determine its efficacy.

Delirium in childhood can develop due to many etiological factors (Hatherill & Flisher, 2010). In clinical practice, the difficulty in diagnosing delirium, along with the high likelihood of missing diagnosis and treatment in cases of childhood and adolescent delirium, as well as the limited written research on childhood and adolescent delirium in our country, has encouraged sharing this case. This case presentation aims to discuss the effectiveness and safety of short-term, low-dose quetiapine use in a hyperactive delirium case that developed after a surgical procedure, where multiple factors, such as hyponatremia, inflammatory response, and the use of sedatives/analgesics, played a role together. Additionally, it aims to increase awareness of delirium in childhood and to support clinicians in early diagnosis and treatment.

## Method

This study is a case report and has been approved by the Ondokuz Mayıs University Non-Invasive Clinical Research Ethics Committee (Decision No: 2025/417, Date: 08/27/2025). Written informed consent was obtained from the patient and their family. The patient's clinical course, laboratory findings, medical treatment process, and psychiatric evaluation were retrospectively reviewed. The psychiatric assessment was conducted by a child and adolescent psychiatrist, and the diagnosis was based on DSM-5 criteria. The severity and course of delirium were evaluated using the Delirium Rating Scale (DRS), which was administered during the initial consultation and at a follow-up one week later. To identify possible medical causes contributing to delirium, biochemical parameters, electrolyte levels, and infection markers were thoroughly reviewed. The treatment process was carried out by a multidisciplinary team consisting of pediatric intensive care, pediatrics, infectious diseases, and child psychiatry units. The study was conducted in accordance with the principles of the Helsinki Declaration.

## Case

A 17-year-old male patient was referred to our outpatient clinic from the pediatric intensive care unit after being followed and treated there for 'gastric perforation' following surgery. He was brought in due to visual hallucinations and agitated behavior. About a week prior, the patient was transferred from another center with a diagnosis of acute appendicitis, presenting with complaints of abdominal pain, vomiting, and diarrhea. After clinical evaluation and abdominal ultrasound, it was determined that he required emergency surgery due to gastric perforation. The hallucinations, visual hallucinations, irritability, and attempts to escape from the hospital suddenly began five days after the surgery. Postoperative pain management and sedation were initiated with midazolam and morphine. The midazolam 265 mg/G treatment was used for five days after the surgery and then discontinued. Morphine 27 mg/G was used for one day and then stopped, but four days after the operation, to control pain, it was restarted at a dose of 7.5 mg/G. At the time of presentation, the patient was receiving intravenous hydration, piperacillin/tazobactam 16 mg/G, teicoplanin 800 mg/G, terlipressin 2 mg/G, vitamin K1 10 mg/G, in the pediatric intensive care unit, and was on the 9th day of treatment. It was also noted that the morphine 7.5 mg/G treatment was on the 5th day.

During the mental status examination in the pediatric intensive care unit, the male patient with a weighty appearance had limited communication and speech due to persecutory delusions. During the orientation assessment, the individual was fully oriented, but orientation to place and time could not be evaluated due to persecutory delusions about the examiner. However, according to information obtained from the patient's relative, he repeatedly asked where he was before the examination, was unaware that he was in the hospital, and could not describe the concept of time. In the attention assessment, the examiner noted increased selective attention to questions aimed at obtaining information about the patient himself; he did not respond to questions asked for informational purposes and warned his accompanying relative not to answer either. The mood was irritable, and the affect was consistent with the mood. During the examination, speech increased, with grandiose religious content and flight of ideas. The thought process was disorganized. In the content of thought, persecutory delusions against the examiner were present; he claimed that the examiner was Satan and that he came to obtain information from him and to harm him, which is why he did not answer the questions asked. No hallucinations were observed during the examination; however, according to information from his accompanying relative, he experienced visual hallucinations of seeing family

members who were not actually present within the intensive care unit. In the psychophysiological assessment, sleep and appetite were normal. During the examination, the patient maintained intense eye contact and exhibited increased psychomotor activity. According to information from the treatment team, this clinical picture has fluctuated over the past three days, with periods of complete improvement during the day and an increase in complaints mostly in the evening hours. During these episodes, the patient wanted to get up from bed and leave the hospital, talked to themselves, and had an irritable mood. In the initial assessment with the delirium evaluation scale, the patient scored 23 points.

It was learned that the patient, who has no notable features in their past medical history, has no previous psychiatric complaints or psychiatric consultations, and that their maternal lineage is under follow-up and treatment for an anxiety disorder and is using Sertraline 100 mg.

One week after the operation, laboratory tests performed during follow-up showed WBC: 13.4 thousand/uL, lymphocyte percentage: 11.6, neutrophil percentage: 80.2, CRP: 225, and sodium (Na): 130. Based on the laboratory results and clinical condition, due to the lack of improvement in sepsis status and suspicion of an infection focus, percutaneous abscess drainage was performed under interventional radiology guidance after an abscess was detected on the patient's abdominal ultrasound on the 10th day post-operation. The patient's current hyponatremia was referred to the Pediatric Department, and oral salt 1x 5mg was recommended. Follow-up showed Na: 133 and urine Na: 225. It was thought that the decrease in sodium reabsorption and the reduction in serum sodium levels were related to impaired renal tubule function, leading to tubulopathy, as a result of increased salt excretion in excess of homeostatic needs due to increased urine output. Therefore, the patient was switched to a high-sodium diet and given oral table salt, with electrolyte monitoring requested. After approximately two weeks of hospitalization, the patient's labs showed WBC: 6.5 thousand/uL, lymphocytes: 1.65, neutrophil percentage: 62.5, CRP: 50.6, and sodium (Na): 136, indicating clinical improvement. The patient was discharged with oral cefuroxime 2x1mg/g and was called for follow-up and examination at the Pediatric Surgery outpatient clinic after one week.

**Findings**

**Table1.** *Treatment Flow Chart*

| **21.07.2024** | **26.07.2024** | **29.07.2024** | **16.08.2024 (Discharge)** |
|---|---|---|---|
| Piperacillin/tazobactam 16 mg/G, | Piperacillin/tazobactam 16 mg/G, | Piperacillin/tazobactam 16 mg/G, | Piperacillin/tazobactam 16 mg/G, stopped |
| Teicoplanin 800 mg/G, | Teicoplanin 800 mg/G, | Teicoplanin 800 mg/G, | Teicoplanin 800 mg/G,-stop |
| Terlipressin 2 mg/G, | Terlipressin 2 mg/G, | Terlipressin 2 mg/G, | Terlipressin 2 mg/G,-stopped |
| Morphine 1x27mg | Morphine 1x7.5mg | Morphine 1x7.5mg -stopped | - |
| Vitamin K1 10 mg/day (due to INR:2) | Vitamin K1 10 mg/day (due to INR:2) | Vitamin K1 10 mg/day (due to INR:2) | Vitamin K1 10 mg/day (due to INR:2) -stopped |
| Midazolam 1x265 mg / 5 ampul | Midazolam 1x265 mg / 5 ampul -stopped. | - | - |
| Intravenous hydration therapy | Intravenous hydration therapy | Intravenous hydration therapy | - |
| | | -1st Day: Quetiapine 25mg/day<br>-2nd Day: Quetiapine 50 mg/day<br>-3rd Day: Quetiapine 50 mg/day | - |
| | | | 3x500 mg Metronidazole 2x1 g Cefuroxime at discharge |

**Table2.** *Laboratory Results*

| **Blood Parameters** | **21.07.2024** | **26.07.2024** | **29.07.2024** | **05.08.2024** | **16.08.2024** |
|---|---|---|---|---|---|
| **Hb** | 18.4 g/dl | 12.8 g/dl | 13.8 | 12.6 | 12.1 |
| **WBC** | 3.60 x10³/L | 13.04 x10³/L | 17.87 | 8.65 | 6.75 |
| **Neutrophil %** | 73.3 | 80.2 | 83.6 | 66.1 | 62.5 |
| **Lymphocyte %** | 15.3 | 11.6 | 9.6 | 20.5 | 24.4 |
| **CRP** | 338.79 | 225.81 | 255.99 | 131 | 50.6 |
| **Sodium (Na)** | 132 | 135 | 131 | 135.6 | 135.4 |
| **Potassium (K)** | 4.38 | 3.48 | 4.11 | 4.5 | 3.95 |
| **Chloride (Cl)** | 104 | 102 | 101 | 101 | 101 |

When evaluating the findings related to the case, it was considered that this clinical picture may have been triggered by hyponatremia developed based on sepsis resulting from gastric perforation, electrolyte imbalance due to postoperative tubulopathy, and the use of analgesic and anxiolytic drugs for pain control, which may have triggered an active delirium. The patient's underlying medical condition was corrected, sedative hypnotics were not used during this process, and the pediatric intensive care doctors were informed to regulate serum electrolyte balance. It was also recommended that if this clinical picture disrupts treatment compliance or if agitation increases, quetiapine 25 mg/day should be used. The patient's clinical status and treatment response were monitored twice a week. During these follow-ups, information from the treatment team indicated that sedative hypnotics were avoided to ensure pain control and sedation, and that serum electrolyte levels were monitored to maintain normal ranges, resulting in an appropriate electrolyte balance.

During the follow-up assessment conducted one week later, the patient was found to be conscious, oriented, and cooperative, fully oriented to place, time, and person, with increased participation in the interview. The thought content included the hospital process, the flow of thought was coherent, and there were no visual or auditory hallucinations. The agitation was reduced. The delirium assessment scale score was 6 points.

**Discussion**

This case report presents the treatment of a hyperactive delirium, attributed to polyetiology, in an adolescent patient using short-term, low-dose quetiapine. In diagnosing delirium, the absence of a prior psychiatric history and psychotropic use, the sudden onset of symptoms with fluctuating course during the day, impaired orientation to place, time, and person, decreased functional level, presence of visual hallucinations, and scores from the Delirium Rating Scale were evaluated. The literature indicates that, in children, the most common cause of delirium is infection (Turkel & Tavaré, 2003). In our case, the delirium that developed was thought to be related to sepsis that occurred and persisted before and after the gastric perforation surgery, hyponatremia caused by postoperative electrolyte imbalance, and the use of high-dose sedatives and benzodiazepines for pain control. The sudden onset of delirium after surgery and analgesic treatment (midazolam and morphine), along with the improvement following discontinuation of analgesics and initiation of low-dose quetiapine (25-50 mg), supports this hypothesis. A case series published in the pediatric age group, including four cases, examined the effects of quetiapine in treating delirium in children with acute infections. The study reported that short-term use of quetiapine at doses of 25-100 mg resulted in improvement in delirium symptoms (Traube et al., 2013). In our case, the effects of low-dose (25-50 mg) quetiapine are similar to those reported in the literature for short-term use. It has been noted that delirium cases in children and adolescents are often missed, but once diagnosed, the response rate to treatment is high (Schieveld et al., 2007). Our patient's positive response to treatment supports these observations. In managing delirium, the primary focus should be on identifying and eliminating the underlying cause. Certain medications that may worsen or mask delirium should be avoided, and necessary drugs should be administered at the lowest effective dose possible (Hatherill & Flisher, 2010). Treatment of delirium in young children should include both psychosocial and pharmacological interventions. In our patient, analgesic medications were discontinued, sedative-hypnotic drugs were reduced, and quetiapine was started at 25 mg and gradually increased to 50 mg. Additionally, psychoeducation was provided to the family, and environmental modifications were made to support orientation. Delirium can be classified into three types based on clinical presentation: hyperactive, hypoactive, and mixed (Martini, 2004). Due to the presence of psychomotor agitation, hyperactive delirium was suspected in our patient.

Due to delirium increasing mortality and morbidity, it can be said that child psychiatrists, pediatricians, and doctors and nurses working in intensive care units should be cautious about acute mental state changes in children and adolescents. The fact that delirium clinical presentation can be confused with many other diagnoses, along with insufficient recognition, may lead to unnecessary medication use and treatments that worsen the condition, as well as missing the diagnosis altogether, which hampers proper treatment. In this case, low-dose, short-term quetiapine use showed a positive response with no side effects. This situation appears advantageous in preventing side effects that could develop from long-term and high-

dose antipsychotic use. Although the efficacy of low-dose (25mg-50mg) medication in delirium has been demonstrated, haloperidol remains the first choice, especially for agitated delirium, in this age group. More comprehensive studies with larger sample sizes are needed to observe the long-term effects of low-dose quetiapine, compare its efficacy and side effects with higher doses, and better understand its safety profile.

**Declarations**

**Ethics Approval and Participation Permission: Research Implementation**
Approval has been obtained from Ondokuz Mayıs University Non-Interventional Clinical Research Ethics Committee for the implementation of the research (Decision No: 2025/417, Date: 27.08.2025)

**Publication Permission**
Not applicable.

**Availability of Data and Materials**
Not applicable.

**Conflict of Interest**
The authors declare that they have no conflict of interest.

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**Author Contributions**
FBT, MEE, and MBU designed the study, conducted the data collection phase, interpreted the results, and conducted literature research. FBT, MEE, and MBU wrote the article, and MBU performed the critical review. All authors have read and approved the final version of the manuscript.

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