

## 4-YEAR-OLD CASE WAS ADMITTED TO HOSPITAL WITH DELIRIUM CAUSED BY DEHYDRATION AND METABOLIC ACIDOSIS

*4 Yaşında Dehidratasyon ve Metabolik Asidozun Neden Olduğu Deliryum ile Hastaneye  
Başvuran Olgu*

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### ABSTRACT

### ÖZ

Delirium, a potentially reversible, acute-onset organic brain syndrome, is a behavioral manifestation of acute brain dysfunction associated with underlying medical conditions. It presents as marked and inconsistent mental changes characterized by dysregulated states of focus and cognition. It can be caused by several different causes, including infections, drugs, toxins, metabolic disorders, and a number of other medical conditions. This case report presents a 4-year-old girl with short bowel syndrome, who developed hyperactive delirium due to acute metabolic acidosis.

**Keywords:** Delirium, dehydration, metabolic acidosis

Potansiyel olarak geri dönüşümlü, akut başlangıçlı bir organik beyin sendromu olan deliryum, altta yatan tıbbi durumlarla ilişkili akut beyin işlev bozukluğunun davranışsal bir tezahürüdür. Düzensiz biliş durumları ile karakterize belirgin ve tutarsız zihinsel değişiklikler olarak ortaya çıkar. Enfeksiyonlar, ilaçlar ve toksinler, metabolik bozukluklar ve diğer tıbbi hastalıklar dahil olmak üzere birkaç farklı nedenden kaynaklanabilir. Bu olgu sunumunda, akut metabolik asidoz nedeniyle hiperaktif deliryum gelişen kısa barsak sendromlu 4 yaşında bir kız çocuğunu sunmaktadır.

**Anahtar Kelimeler:** Deliryum, dehidratasyon, metabolik asidoz



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## INTRODUCTION

Delirium is an acute-onset organic brain syndrome occurring due to rapid and diffuse brain dysfunction. Although the exact mechanism is not clearly known, brain metabolism is impaired because of the inability of nerve cells to receive enough oxygen and glucose, and as a result; disorders of consciousness develop. The treatment is shaped according to the underlying cause. Many disorders and conditions, such as infections, drugs, toxins, and metabolic disorders may cause delirium (1). In this case report, a 4-year-old girl who developed hyperactive delirium due to acute metabolic acidosis is presented.

## CASE REPORT

A 4-year-old female with no history of fever, vomiting, seizure, drug use, or recent travel presented to the children's emergency department with watery diarrhea with no mucus or blood. Nonstop crying for approximately 3 hours, with an inability to recognize her mother was stated. Her medical history included multiple operations due to jejunal atresia, which consequently caused the patient to have short bowel syndrome. The patient did not have any previously diagnosed neurological or psychiatric diseases, and her neurological development until that time was normal. At admission, she was unable to communicate even with her mother and the patient was agitated with inconsolable crying. On physical examination, no tears coming out of her eyes while she was crying, and her oral mucosa was dry. She lost 500 grams (7% of her current weight). She had mild abdominal distension with no tenderness on palpation. On auscultation, she had hyperactive bowel sounds. The laboratory tests showed normal blood glucose. On arterial blood gas analysis was as follows: pH: 7.23, pCO<sub>2</sub>: 27.3 mmHg, cHCO<sub>3</sub>: 13.1 (mEq/L), lactate: 1%. On complete blood count, hemoglobin was 13 g/dL, white blood cell count was 14000/mm<sup>3</sup>, and platelet count was 240 000/mm<sup>3</sup>. Serum electrolyte tests showed sodium: 136 mmol/L, potassium: 3.4 mmol/L, chloride: 107 mmol/L, calcium: 10.1 mg/dL, and phosphorus: 5.0 mg/dL. The C-reactive

protein was 0.8 mg/dL. Kidney function test (urea and creatinine levels), liver function test (alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, bilirubin levels) and urinalysis were in normal ranges. Dilated bowel loops with widespread gas were detected on the direct abdominal radiograph, and no signs of obstruction were found. An enema was performed, but the patient did not experience any relief. Intravenous fluids and paracetamol (10 mg/kg/dose) were administered to relieve the abdominal pain. After 10 hours of rehydration therapy, dehydration was resolved; however, the patient had persistent diarrhea. No parasites, adenovirus, or rotavirus were detected on stool examination. Arterial blood gas analyses were performed every 6 hours. On the 14th hour, the bicarbonate level in the blood gas was in normal ranges, and the patient's clinic returned to normal simultaneously. Her diarrhea continued for 2 days after the delirium symptoms were resolved, and the patient was discharged with full recovery.

## DISCUSSION

Delirium is a clinical brain syndrome with rapid onset and fluctuating changes in consciousness, perception, and sleep-wake cycles. Fogging, fluctuation, and disorientation in consciousness is evident, and disorders of psychomotor activity and affective state often occur. According to their alertness and psychomotor activity, patients with delirium are classified primarily into 3 types: hyperactive, hypoactive, and mixed. The patient may shift rapidly between the hyperactive and hypoactive stages. In general, a critical acute medical illness precedes delirium (2). Hyperactive delirium is characterized by agitation, restlessness, and irritable behavior. Hypoactive delirium is notable for lethargy, inattention, and decreased responsiveness. Mixed-type delirium exhibits aspects of both (3). The most common etiological factors of delirium are electrolyte imbalances, metabolic changes, drug intoxications, brain traumas, and postoperative medical conditions. Our patient had developed short bowel syndrome due to multiple operations for ileal atresia and she was

presented with dehydration and metabolic acidosis due to diarrhea. Aldemir et al. detected metabolic acidosis as a predisposing factor with a rate of 7.6% in cases of delirium (4). Similarly, in the study of Pisani et al. among intensive care patients who developed delirium, metabolic acidosis was found to be a risk factor for delirium (5).

The diagnosis of delirium is based on clinical symptoms. The sudden onset of symptoms and challenges of soothing the child support the diagnosis of delirium (6). In our case, the diagnosis of delirium was supported by the absence of previous neuropsychiatric disease, the presence of chronic disease (short bowel syndrome), the acute onset of symptoms occurring after gastroenteritis, and regression after supportive treatment. Although delirium is generally temporary and reversible, it is a medical condition that requires urgent intervention that significantly increases morbidity and mortality in patients with severe medical diseases. Previous studies detected a strong relationship between delirium and mortality (7). Early detection of the correct diagnosis and proper treatment of medical conditions that led to the development of delirium are the most important factors that improve the prognosis. There is no certain treatment. The underlying cause should be determined, and the condition should be treated accordingly. In our case, the cause of delirium was metabolic acidosis due to dehydration and intestinal bicarbonate loss. In contrast, although the symptoms of delirium generally last for 3–5 days, the duration of the condition varies. Delirium was improved simultaneously with the normalization of arterial blood gas on the 14th hour of hospitalization in our case.

In conclusion, several medical conditions have a risk of developing delirium, which includes impaired metabolic deterioration that leads to abnormal neurotransmission. Early identification of the etiology of delirium is important for implementing the appropriate treatment.

*Conflict of Interest:* All authors declare that there is no conflict of interest.

*Researchers' Contribution Rate Statement:*

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## REFERENCES

1. Martini DR. Delirium in the pediatric emergency department. *Clinical Pediatric Emergency Medicine*. 2004;5(3):173-80.
2. Schieveld JNM, Leentjens AFG. Delirium in severely ill young children in the pediatric intensive care unit (PICU). *Journal of the American Academy of Child & Adolescent Psychiatry*. 2005;44(4):392-4.
3. Patel AK, Bell MJ, Traube C. Delirium in pediatric critical care. *Pediatric Clinics of North America*. 2017;64(5):1117-32.
4. Aldemir M, Ozen S, Kara IH, Sir A, Bac B. Predisposing factors for delirium in the surgical intensive care unit. *Critical Care*. 2001;5(5):265-70.
5. Pisani MA. Characteristics associated with delirium in older patients in a medical intensive care unit. *Archives of Internal Medicine*. 2007;167(15):1629-34.
6. Turkel SB, Tavare CJ. Delirium in children and adolescents. *The Journal of Neuropsychiatry and Clinical Neurosciences*. 2003;15(4):431-5.
7. Traube C, Silver G, Gerber L, Kaur S, Mauer EA, Kerson A et al. Delirium and mortality in critically ill children: epidemiology and outcomes of pediatric delirium. *Critical Care Medicine*. 2017;45(5):891-8.