

Hyperammonemic Induced Coma by Bacterial Overgrowth in a Child With Hirschsprung's Disease

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Abstract- Cases with Hirschsprung's disease show the functional intestinal obstruction. Obstruction in these patients may lead to bacterial overgrowth with stasis and inflammation of the colon. Bacterial overgrowth can cause hyperammonemia that makes lethargy and loss of conscious and finally admitting in ICU. The purpose of this case report is to present a case that had Hirschsprung's disease and referred to Children's Medical Center with serum hyper-ammonium caused by bacterial overgrowth that induced coma and altered level of consciousness then made her to admit to PICU. A 15-year-old female referred to Children's Medical Center with lethargy and low grade diarrhea. She had hypocalcemia and hypoalbuminemia with high PT and INR. Because of loss of conscious, she admitted at PICU. Laboratory findings showed hyperammonemia in this case, but other criteria were normal. Administration of antibiotic and lactulose therapy was started that lead to a reduction in serum ammonium level and discharging of the case. Thirteen days later she referred again with mentioned symptoms, and clinical evaluations showed high serum ammonium level. This time because of loss of conscious she had to admit at PICU and used NG tube. Administration of lactulose syrup and sodium benzoate make her in a better condition. Narrowing rectum toward the sigmoid and highly enlarged intestinal lopes was on behalf of Hirschsprung's disease. Finally, the patient with the acceptable situation and oral periodic metronidazole discharged. It is essential to check serum ammonium level in the cases with loss of conscious. The choice for controlling hyperammonemia is lactulose therapy.

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Introduction

The congenital cause of functional intestinal obstruction is Hirschsprung's disease (HSCR) (1). This disorder is compatible with the child since the birth but unfortunately sometimes, its presentation will be at late years olds (2). HSCR's incidence is 1 in 5000 live birth worldwide (3). Overall the male to female ratio accounts for 4:1 (4). The incidence rate of diagnosis is 15% through the first month of life, 40-50% during the first three months, 60% at the end of one year old and 85% by four years old (5).

HSCR affections are the rectum and sigmoid (70%), a long segment of colon (20%) or can lead to aganglionic of the total colon (8-10%) (6). Reported reports revealed that some patients with HSCR develop chronic or acute obstruction that leads to bacterial overgrowth with stasis and inflammation of the colon.

The useful pattern for controlling bacterial overgrowth is colonic irrigation (7).

Ammonium produces by protein digestion through bacterial metabolism in the intestine (8). The situation of hyperammonemia may follow by bacterial overgrowth especially in the presence of gram negative bacilli that produce urease (9). The important factor in making hepatic coma is ammonia toxicity (10). Ammonia toxicity occurs whenever the serum level of ammonia reaches more than 40 mmol/L (11). At general hepatic coma can be known as a complication of hyperammonemia that should diagnose and treat as soon as possible (11).

Here, we report a female case who had Hirschsprung's disease and referred to Children's Medical Center with serum hyper-ammonium caused by bacterial overgrowth that induced coma and altered level of consciousness then made her to admitted to PICU.

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Case Report

First hospitalization

A 15-years-old female (known the case of Hirschsprung's disease) referred to Children's Medical Center (CMC) complaining of failure to thrive, pale and low grade diarrhea for nearly one week. She was hospitalized at CMC with suspicious of sepsis.

At her first admission, she had hypocalcemia (5.6 mg/dl), hypoalbuminemia (1.8 mg/dl), high PT (2.8) and INR (2.1) tests. Results of aminotransferases, electrolytes, ammonium and bilirubin were reported as normal, but she had a report of Vitamin K deficiency and malabsorption.

Six days following her hospitalization, she referred to PICU because of sleepiness and delirium. Laboratory tests showed serum hyperammonemia (2.7 mg/dl), high PT (25.3) and INR (3.1) but other tests as aminotransferases, electrolytes, CBC and LP were normal. Clinical screening revealed abdominal distention in the patient. Abdominal sonography reported enlarged intestinal lopes that suggested for toxic megacolon because of Hirschsprung's disease. According to proceed in decreasing of loss of conscious, the patient was intubated. At that time the brain CT-scan and CSF culture were normal. The case was treated by ceftazidime (2 g/IV/TDS), vancomycin (400 mg/IV/TDS), metronidazole (400 mg/IV/TDS), sodium benzoate (10 gr/24hr) and lactulose syrup (10 cc/TDS).

The patient was consulted with surgery department because of highly abdominal distension and as a result of the unstable situation; the medical management was done through obliteration with the rectal tube. Following these procedures, serum ammonium level decreased to 1.1 mg/dl and then to 0.7 mg/dl respectively. Improvement in loss of conscious and serum ammonium made the clinicians discharge the patient with a stable condition.

Second hospitalization

Thirteen days following discharging, the patient referred to CMC with complaining of anal pain abdominal distention without defecation. There wasn't any abscess in the anal region, but defecation was compatible with pain and low fever. Again the case was hospitalized and treated with ceftazidime (2 gr/IV/TDS) and vancomycin (350 mg/IV/TDS).

Sonography screening showed normal perianal region. Laboratory tests reported as hypocalcemia (7.8 mg/dl), hypoalbuminemia (2.9 mg/dl), high PT (2) and

INR (2.6) but other tests for transaminases and bilirubin were normal. These results were according to her malabsorption.

Three days after hospitalization, serum ammonium level increased to 3.5 mg/dl, hydrogen breath test showed 30 ppm hydrogen above basal level, and decreased of loss of conscious occurred for the case. Sonography pattern reported as high dilatation of colon (more than 6 cm in diameter) with enlarged intestinal lopes that were suggested of the mega toxic colon. Glasgow coma scale (GCS) was 8, so the patient referred to PICU and NG tube inserted for her then administered with lactulose syrup administration, sodium benzoate (4 g/24 hr) and metronidazole (350 mg/IV/TDS).

Four days following therapy, the ammonium level decreased to 1.2 mg/dl and the loss of conscious, serum albumin also calcium improved, abdominal distention was decreased, and other laboratory tests were normal. In this case narrowing rectum toward the sigmoid and highly enlarged intestinal lopes were on behalf of Hirschsprung's disease. Finally, the patient with the acceptable situation and oral periodic metronidazole discharged from the CMC.

Discussion

This is the first observational case report for Children's Medical Center aimed at defining a Hirschsprung's case that altered with bacterial overgrowth that leads to hyperammonemia induced coma. A reason why none previously addressed this issue relies on the rarity of this disease (11). Absolutely there are more retrospective reports that focus on the basis of HSCR and its management (1). The presentation of this study revealed remarkable characteristics.

Literature and reviews show that up to 10% of patients with HSCR may have some complicated symptoms (1). One of the most complications associated with enterocolitis (4). Cases with enterocolitis should be monitored about this situation.

The former studies indicate that hyperammonemia situation can be because of the association between variable types of intestinal organisms (10). This interaction can be the major cause of morbidity and mortality in patients with HSCR (10). Nearly 2 to 33% of this interaction occurs after or sometimes many years later following surgical therapy (2).

The effective system for converting waste nitrogen into urea from protein intake in the body is urea cycle (8). Defects in the urea cycle result of common

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presentations such as somnolent, hyperventilation, seizure followed by lethargy and coma (11). The major difficulty is insufficient awareness of medical staffs because of the rarity of routinely checking for plasma ammonia levels (9). Progression and deficiency of urea cycle defects depend on varied triggers that one of them can be bacterial overgrowth (10). In this situation evaluation of blood and plasma ammonia will be the useful pattern for recognition and early treatment (11). Late diagnosis and therapy will be induced hyperammonemic coma in patients.

Administering of lactulose make the decreasing of PH of the colon and instead initially lead to suppressing counts of ammonia producing organisms and cause temporary reduction of ammonia level (8). Absolutely reported reports confirmed that reduction in the counts of ammonia producing organisms is not a complete way for decreasing of ammonia level. In fact following lactulose therapy, there should be some extra screening for considering the major source of hyperammonemia in the patient (1).

Serum plasma ammonia should be checked in the cases of undefined consciousness. Antibiotic therapy is a choice for reducing urease producing gram negative bacteria furthermore therapy of hyperammonemia depends on etiology. The first step is to eliminate the major cause. The common therapy implies lactulose is treating for decreasing gastrointestinal PH. Due to this lower pH there will be a hostile environment for urea producing bacteria that finally lead to reduced ammonia production. The presented case was a known patient of HSCR, who referred to CMC with low consciousness and lethargy, more evaluations revealed of hyperammonemia that lead to coma and admitting of hospitalization in ICU. Screening showed that her hyperammonemia situation was for bacterial overgrowth. Finally by antibiotic and lactulose therapy her GCS and conscious improved and she discharged from the CMC.

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