A Rare Case of β-Ketothiolase Deficiency

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ABSTRACT

We are reporting a case of β-ketothiolase deficiency, a rare disorder of amino acid metabolism. A 10 month old child presented with complaints of vomiting, convulsions, fever and altered sensorium that on investigations showed metabolic acidosis, hyperammonemia and ketosis. Gas chromatography/ mass spectroscopic examination was suggestive of β-ketothiolase deficiency.

Key words: β-ketothiolase deficiency, metabolic acidosis, ketosis

Introduction:

β-ketothiolase deficiency is an organic acid disorder that result from inability to process the amino acid isoleucine and ketone bodies. Its deficiency occurs in less than 1 in 100000 births. It is inherited as an Autosomal recessive disorder. Mutation in the ACAT1 gene causes β-ketothiolase deficiency. Individuals with β-ketothiolase deficiency are at risk of developing metabolic crisis, particularly after fasting, illness/infection or high protein intake. Patients usually present with lethargy, ketosis, metabolic acidosis, feeding difficulty, fever, diarrhea, hypoglycemia /hyperglycemia and sometimes as coma or death.

Case History:

A 10 month old male child presented with complaints of vomiting, altered sensorium, fever and convulsions since 2 days. On examination, the child had respiratory distress with acidotic breathing and some pallor. Bilateral air entry was present with fine crepitations. On CNS examination, the child was stuporous with hypotonia and deep tendon reflexes were absent, there were no signs of meningeal irritation. The child also had mild hepatomegaly. On investigation, Hemoglobin level was 8.3 mg/dl, total counts were 23400/mm^3, platelet counts were 2.34lakh/mm^3. Renal function tests were normal. CRP was positive. Patient was put on Intravenous antibiotics for pneumonia and sepsis. In view of patient having severe respiratory distress and acidotic breathing, ABGA was done which showed severe metabolic acidosis. Hydration and sodium bicarbonate were administrated for acidosis. Inspite of hydration and sodium bicarbonate administration, serial ABGA showed persistent metabolic acidosis. On further investigation, serum acetone was found to be elevated and serum ammonia level was high. CSF examination was normal. MRI brain showed multiple focal lesions in basal ganglia, fronto-parietal and temporo-occipital white matter likely to be an acute demyelinating lesion. As the patient had metabolic acidosis with ketosis and hyperammonemia and with a high suspicion of organic acid disorder we went for Gas chromatography/ mass spectroscopy test for urine, which showed increased amount of 2-methylacetoacetate, 2-methyl 3-hydroxybutyrate and

triglylglycine in urine indicating β-ketothiolase deficiency. Treatment for β-ketothiolase deficiency was instituted which includes high calorie low protein diet, syrup levocarnitine and vitamin B-complex. With treatment, there was improvement in clinical condition of the patient and finally the patient was discharged on low protein high calorie diet with syrup levocarnitine and vitamin B-complex.

Discussion:

β-ketothiolase deficiency is a rare Autosomal recessive disorder. It is an organic acid disorder that results from inability to process the amino acid isoleucine and ketone bodies. Clinical manifestations are quite variable, ranging from an asymptomatic course in an adult to severe episodes of acidosis starting in the first year of life. These children have intermittent episodes of unexplained ketosis and acidosis which usually occurs after an intercurrent infection, fasting or high protein intake. Patients with β-ketothiolase deficiency usually present with fever, vomiting, altered sensorium, and dehydration and on investigation they show metabolic acidosis, ketosis, and hyperammonemia. Our patient presented with above signs and symptoms at 10 month of age which was precipitated by sepsis. For confirmation of diagnosis of this disorder, Gas chromatography/ mass spectroscopy test of urine should be done which would show increased amount of 2-methylacetoacetate, 2-methyl 3-hydroxybutyrate and triglylglycine. Our patient also showed increased amount of 2-methylacetoacetate, 2-methyl 3-hydroxybutyrate and triglylglycine which was suggestive of β-ketothiolase deficiency. Treatment of this disorder includes hydration and infusion of bicarbonate to correct metabolic acidosis. A 10% glucose solution with appropriate electrolyte and intravenous lipid may be used to minimize catabolic state. Restriction of protein intake to 1-2 gm/kg/day is recommended for long term therapy. L-carnitine should be given to prevent secondary carnitine deficiency. Vitamin b-complex is also recommended. Long term prognosis for achieving normal life seems favorable. Thus early diagnosis of this disorder has good prognosis.

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