Into the Unknown: A Curious Case of Hyperammonemia

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INTRODUCTION

Hyperammonemia is a metabolic disorder characterized by high levels of ammonia. Around 90% of hyperammonemia cases are due to cirrhotic liver disease. Less common causes are congenital or acquired disorders involving enzymatic defects in the urea cycle, organic acidemias, fatty acid oxidation and amino acid deficiencies. Adult onset non-cirrhotic hyperammonemia is extremely rare. We present a case of adult onset non-cirrhotic hyperammonemia and how a multidisciplinary approach allowed for successful management of the patient condition.

CASE PRESENTATION

Case of a 65-year-old male with history of diabetes mellitus type II (DM-II) and hypertension, with multiple admissions due to encephalopathy secondary to hyperammonemia. He was initially managed with lactulose, with partial response. Gastroenterology service was consulted, and an extensive workup was negative for liver offenders. Imaging studies and liver chemistries were unrevealing, and cirrhosis was ruled out. No offending medications were present. Due to DM-II, small intestinal bacterial overgrowth was suspected, however after a course of antibiotics he had no response. The presence of urease producing bacteria was considered but resulted negative. Due to lack of response and no identifiable cause, an interdisciplinary approach with endocrinology service was done. An extensive genetic workup was negative for the most common mutations related with acquired hyperammonemia like urea cycle disorders, amino acid deficits or fatty acids oxidation disorders. Only abnormality was elevated threonine levels with normal citrulline levels in serum but elevated in urine. Mutation for Citrullinemia type- II was negative, however, before obtaining the results, he was medically managed as having citrullinemia type II with a low carbohydrate diet and Arginine supplementation. After this, ammonia levels decreased, and encephalopathy resolved completely. Patient continued this diet and has not been readmitted to the Hospital after normalization of the ammonia levels.

BIOCHEMICAL PATHWAYS

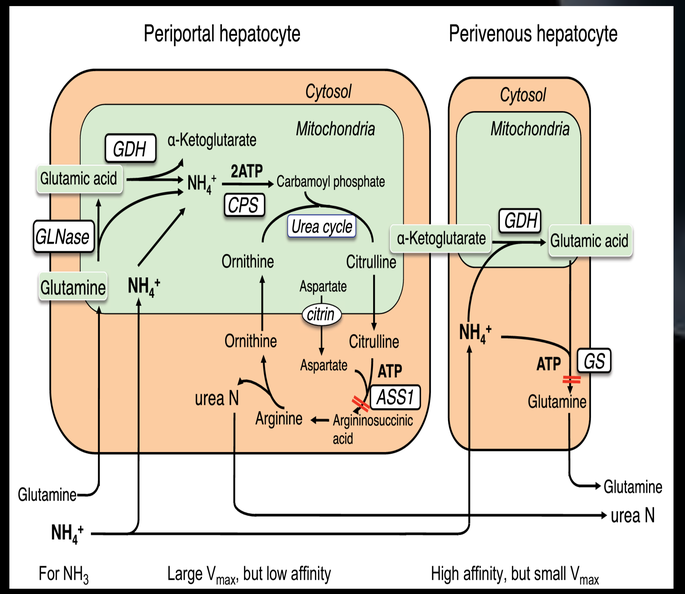

Figure1.Ammonia metabolism in liver. ASS1(argininosuccinate synthase 1); ATP(adenosine triphosphate) CPS(carbamoyl phosphate synthetase) GDH(glutamate dehydrogenase) GLNase(glutaminase) GS, glutamine synthase. Obtained from: Kiyoshi Hayasaka et al. Adult-onset type II citrullinemia[1]

IMAGING

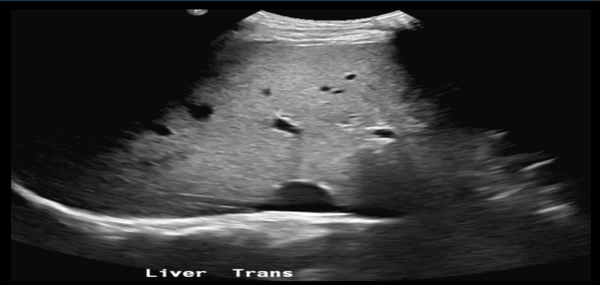

Figure2.Grayscale ultrasound of the liver demonstrating normal hepatic parenchyma, with no sonographic evidence of surface nodularity or other cirrhotic features.

DISCUSSION

- Adult onset non-cirrhotic hyperammonemia is very uncommon and proper identification can be very challenging.
- Although in this case some of the classical mutations in urea cycle were not present, the patient resolved the hyperammonemia state clinically and on laboratory follow up after the initiation of a diet low on carbohydrates and rich in some proteins like arginine.
- These interventions are usually used for the management of conditions that involved total or partial impairment in the enzymatic activity of citrin that could possibly be the case in this patient, although further studies are needed.

TAKE HOME MESSAGE

- Interdisciplinary approach and clinical input from Endocrinology and Genetics was very important in this case for the proper management of the condition.
- This case demonstrates that despite the challenges of treating rare conditions with challenging clinical presentations, working in coordinated manner allows effective management and successful clinical outcomes.

REFERENCES

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