Severe Noncirrhotic Hyperammonemia: What Urea-lly Should Consider

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Learning Objectives

1. To review the workup and management of hyperammonemia.
2. To learn about etiologies of hyperammonemia when liver pathology is unlikely.

Case Presentation

57-year-old man with HFrecEF, atrial fibrillation, and cervical neck fracture s/p recent corpectomy and fusion presented with worsening dysphagia and found to have a cervical fluid collection. He had no known underlying liver disease and denied significant alcohol history. He received a dexamethasone taper and a lumbar drain. He was admitted to the ICU for unstable atrial fibrillation with RVR. In the ICU, he became more somnolent and was unable to follow commands. Encephalopathy workup revealed hyperammonemia. Liver workup was normal. Workup for inborn errors of metabolism showed mildly decreased citrulline. His hyperammonemia resolved and his mentation improved with lactulose and rifaximin. Urea cycle disorder gene panel and further genetic workup is ongoing and to be continued outpatient.

Inborn errors of metabolism should be on the differential when hyperammonemia is not the result of liver disease.

Labs

WBC 7, **Hb** 9.6, **Plt** 313
Sodium: 142
Potassium: 4.2
Chloride: 103
Carbon dioxide: 34
BUN 91, **Cr** 0.53
Hepatitis A, B, C negative

TPro: 6.7, **Albumin** 1.9
AST/ALT: 136, 149
Alk Phos: 89
TBili: 0.3, **DBili** <0.1
PT/INR: 16.7/1.4
Ammonia 772

Urine and plasma amino acids:
Glutamine – normal
Ornithine – normal
Arginine – normal
Citrulline – 8 (normal 12-55)
Urine organic acids – normal
Urine orotic acid – normal

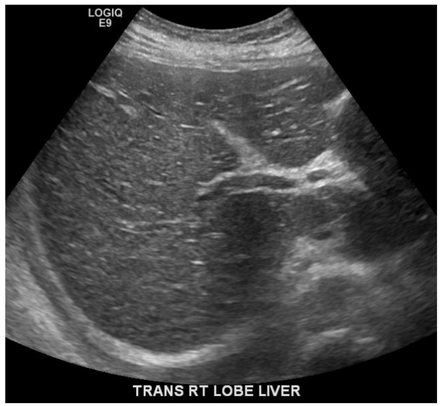

Figure 1. RUQUS with nonspecific heterogenous hepatic parenchyma but no portal vein thrombosis.

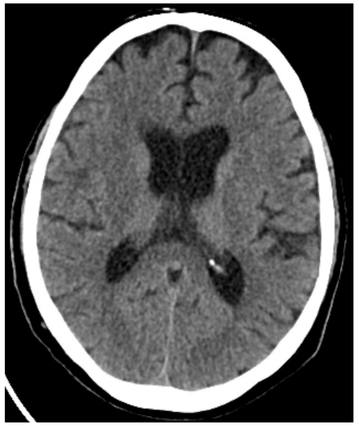

Figure 2. CT head with no cerebral edema

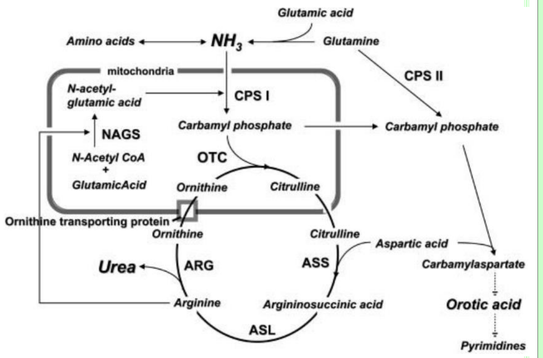

Figure 3. Urea cycle. ASL, argininosuccinate lyase; ARG, arginase; NAGS, N-acetylglutamate synthetase.

Discussion

- Patients with elevations of ammonia present with encephalopathy, which may progress quickly to cerebral herniation.
- Liver disease, medications, degradation of blood products, and high protein tube feeds can lead to hyperammonemia and elevated BUN.
- A workup for inborn errors of metabolism (IEMs), like a urea cycle disorder, should be considered in unexplained hyperammonemia.
- IEMs may be unmasked by steroid therapy.
- Treatment for a potential IEM begins prior to confirmation of an etiology.
- Geneticists should be consulted early on for evaluation and management.

References

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2. Clay AS, Hainline BE. Hyperammonemia in the ICU. *Chest*. 2007;132(4):1368-1378. doi:10.1378/chest.06-2940