High, High Ammonia, How High Can We Go? A Case of Encephalopathy in the Setting of Hemodialysis

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INTRODUCTION

- Ornithine transcarbamylase (OTC) deficiency is the most common urea cycle disorder, occurring in 1:62000-77,000 of births[1]
- Classic presentation is in newborn males who are hemizygous for the OTC gene
- Heterozygous individuals may present late in life[2]

CASE PRESENTATION

- 66-year-old female with history of developmental delay presented to the hospital with decreased responsiveness
- Initial work-up was benign, save for an ammonia of 252 umol/L
- Started on rifaximin and lactulose at maximal doses, CRRT initiated due to poor response
- Liver biopsy showed stage III fibrosis
- Ammonia reached 785 umol/L after ten days.
- Complicated by multiple seizures and acute hypoxic respiratory failure
- Extreme elevations of urine orotic and aconitic acid levels; genetic sequencing showed heterozygous for c.944T>G (p.Val351Gly)
- The patient passed on day eighteen

IMAGES / FIGURES

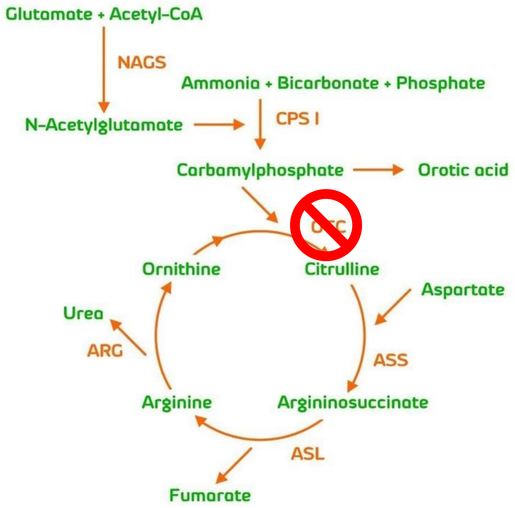


Figure 1: Urea cycle with OTC deficiency

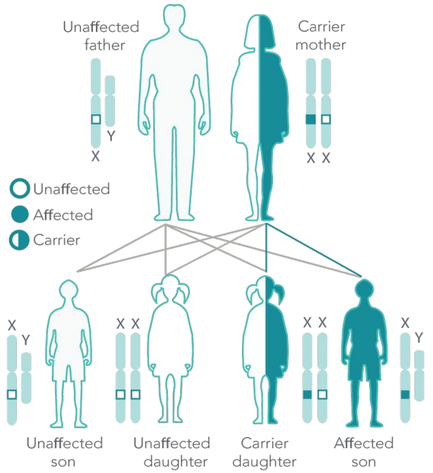
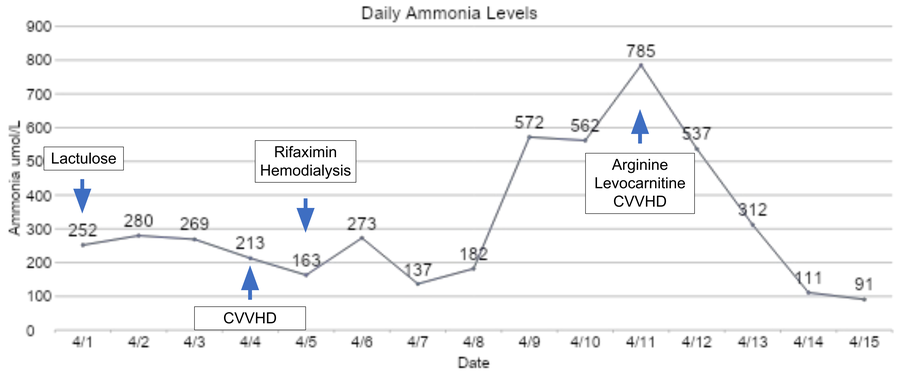


Figure 2: X-linked recessive pattern of inheritance showing an affected son who is heterozygous for the allele, and an unaffected daughter who is heterozygous for the allele



Graph 1: Daily inpatient ammonia levels in relation to initiation of treatment modalities pointed out on days 1, 4, 5, and 11. Life sustaining treatment was withdrawn on day 15.
CVVHD: Continuous veno-venous hemodialysis

DISCUSSION

- OTC deficiency is an X-linked recessive disorder typically relegated to children that is increasingly being recognized in adults
- Females that are heterozygous for the OTC allele may live for years before the condition is recognized
- Insult can lead to decompensation, causing elevations of ammonia which may progress to encephalopathy, coma, and death, unless rapidly reversed by hemodialysis
- A low protein diet and the use of nitrogen scavenging agents are the mainstays of long-term treatment
- For patients with encephalopathy and no clear cause, consider evaluation for hyperammonemia

References

- 1. Aminoacidopathies prevalence
- 2. Updated review of OTC
- 3. https://aspirawh.com/carrier-screening-genetic-testing/
- 4. https://www.comidamed.com/en/applications-urea-cycle-disorders/