A Case of PKU In A Patient With A Failed Renal Transplant

Nabil Faridi, DO, Mariyam Wasay, DO, Anuja Korlipara, MD, Nayna Doniparthi, MS4

St. Charles Hospital
Catholic Health Services
At the heart of health

Stony Brook Medicine

Introduction

- Phenylketonuria (PKU) is a rare inherited disorder that causes phenylalanine to build up in the body. It is caused by a defect in the gene for phenylalanine hydroxylase which is needed to break down phenylalanine. These high concentrations of phenylalanine can build up when a patient eats foods that contain protein or eats aspartame and can be very dangerous. Symptoms from undiagnosed PKU can range from musty odor urine to seizures and intellectual disabilities. Luckily most cases are detected at birth due to widespread testing for newborns. These patients need to follow a very strict low protein diet throughout their life. However, other comorbidities may still present in these patients who maintain low phenylalanine intake.

Case Report

- A 24-year-old female with phenylketonuria and ESRD requiring renal transplant in 2015 presented with AMS and generalized weakness. Labs revealed elevated BUN and creatinine as well as a phenylalanine level elevated to 1700 and low Tyrosine level of 27. Patient was diagnosed with ESRD in the setting of a failing renal transplant. MRI Brain revealed worsening PKU related white matter changes when compared to 6 years earlier. She endorses full compliance with her PKU diet. Once medically stable, patient was transferred to acute rehab.
- Pertinent physical exam findings on admission included bilateral LE weakness causing a significant gait abnormality and sustained clonus. She required moderate assistance ambulating 50 ft and moderate to substantial assistance with bed mobility, toileting, eating, dressing.
- Throughout her rehab stay, patient was also followed by dietician and maintained on strict phenylalanine free diet with total protein intake< 10g daily. By the end of her stay, patient made significant functional gains and was independent with bed mobility and toilet transfers and required clean up assistance or supervision with dressing, transfers, and ambulating 150 feet. Repeat phenylalanine levels improved to 422 (goal< 700).

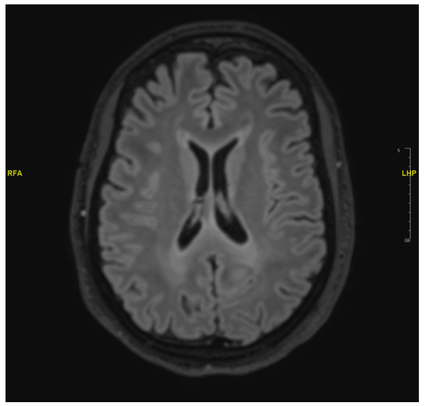

Figure 1

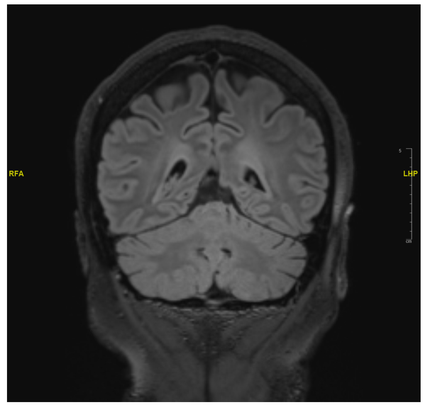

Figure 2

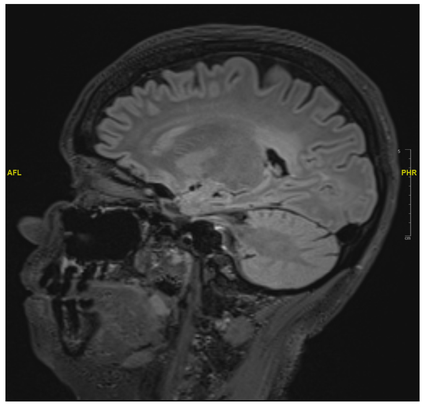

Figure 3

Figures 1, 2, and 3: Brain MRI T2 Flair sequences demonstrating hyperintensity in the periventricular white matter bilaterally compatible with worsening of phenylketonuria.

Discussion

- Phenylketonuria is an autosomal recessive disorder of phenylalanine metabolism caused by a deficiency or inactivity of phenylalanine hydroxylase which is responsible for converting phenylalanine to tyrosine. Tyrosine is a precursor for dopamine, a neurotransmitter that is involved in several functions in the brain, including specific cognitive functions, mood and movement.
- PKU patients might be more susceptible for neurological symptoms caused by cerebral DA deficiency, especially those with high Phe–Tyr ratios. Depletion of tyrosine may cause a deficiency in dopamine in PKU patients which rarely can cause overt parkinsonism, brisk DTRs, tremors and/or clonus.
- Currently the link between PKU and the pathophysiology of developing renal disease is poorly understood. The low protein diet these patients are placed on long-term is believed to be a contributing factor. In the last few decades as the low phenylalanine diet has started to become used, we began seeing the additional comorbidities that can result from PKU. The two most common comorbidities seen in patients with PKU are kidney failure with high blood pressure and obesity. Our patient admits to being fully compliant with her PKU diet and progressed to kidney failure at a young age.

Conclusion

- This is a rare case of phenylketonuria in an ESRD patient with a failing renal transplant, leading to increased phenylalanine levels which contributed to her functional decline. The patient was able to make significant gains during her stay in acute inpatient rehabilitation.

References

- Hennermann JB, Roloff S, Gellermann J, et al. Chronic kidney disease in adolescent and adult patients with phenylketonuria. J Inherit Metab Dis. 2013;36(5):747-756. doi:10.1007/s10545-012-9548-0
- Thompson AJ, Tillotson S, Smith I, et al. Brain MRI changes in phenylketonuria. Associations with dietary status. Brain 1993; 116 (Pt 4):811.
- Koch R, Burton B, Hoganson G, et al. Phenylketonuria in adulthood: a collaborative study. J Inherit Metab Dis 2002; 25:333.