Non-Ketotic Hyperglycemia and Acute Kidney Injury Post COVID: An Interesting Presentation of MODY5

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Introduction:

Mature-Onset Diabetes of the Young (MODY) is a group of 14 heterogeneous autosomal dominant disorders caused by mutations that disrupt pancreatic beta cell function (1). Approximately 1-5% of patients with diabetes have some form of MODY (2,3). The most common MODY gene mutations include alterations encoding:

- hepatocyte nuclear factor 1 alpha (MODY3),
- hepatocyte nuclear factor 4 alpha (MODY1),
- glucokinase (MODY2),
- hepatocyte nuclear factor 1 beta (MODY5) (2).

Less than 5% of total MODY cases are caused by MODY5, which can be characterized by insulin-dependent diabetes mellitus (DM) and abnormalities in renal tract development, as well as genital malformations (4).

Patient Presentation:

A 12-year-old white male with a history of self-resolving nephrogenic diabetes insipidus (diagnosed at age 3 by a pediatric endocrinologist) presented to PCP with polydipsia and polyuria following a COVID infection in June 2022. Labs done were concerning for:

- acute kidney injury (AKI) with Cr 2.04,
- elevated blood sugar of 645 mg/dL,
- elevated Hgb A1c (>15).
- nonketotic at diagnosis
- BMI was around 57% for his age at the time of his diabetes diagnosis
- Antibodies for type 1 diabetes were negative and he was given a diagnosis of type 2 diabetes.

Case Timeline:

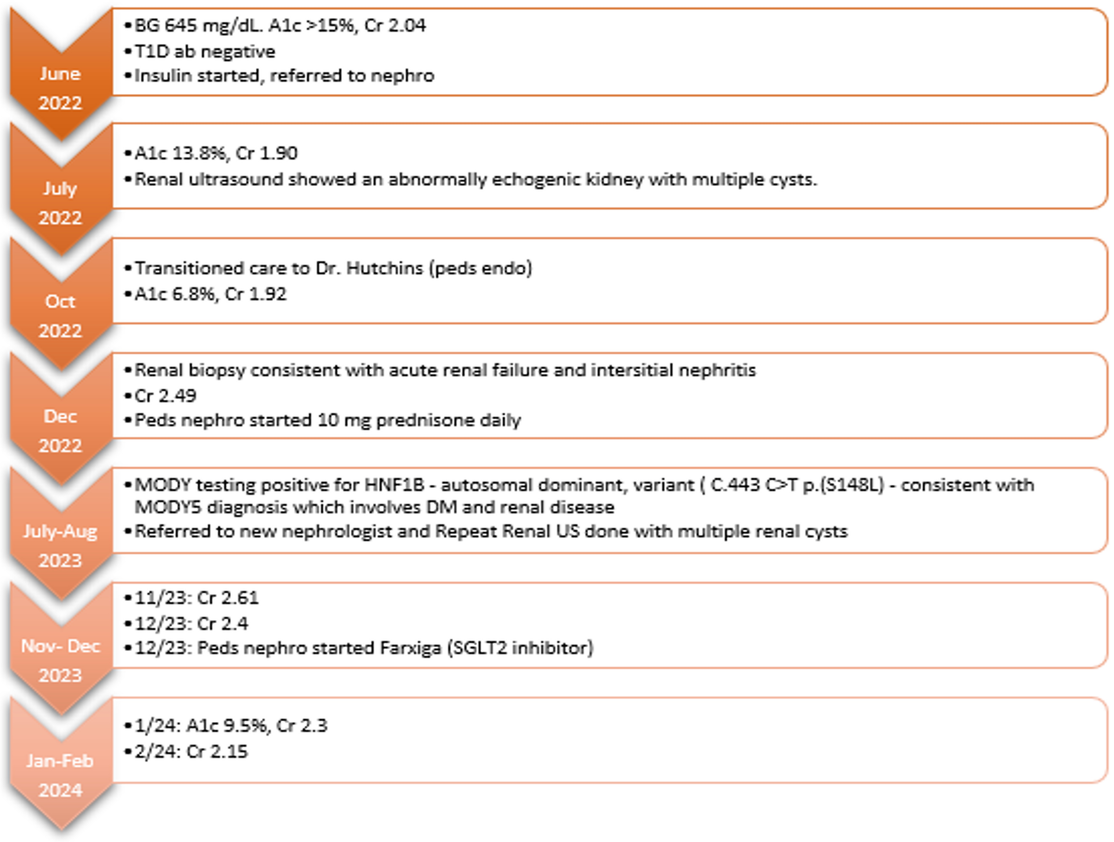

Figure 1. A case progression from June 2022 to February 2024.

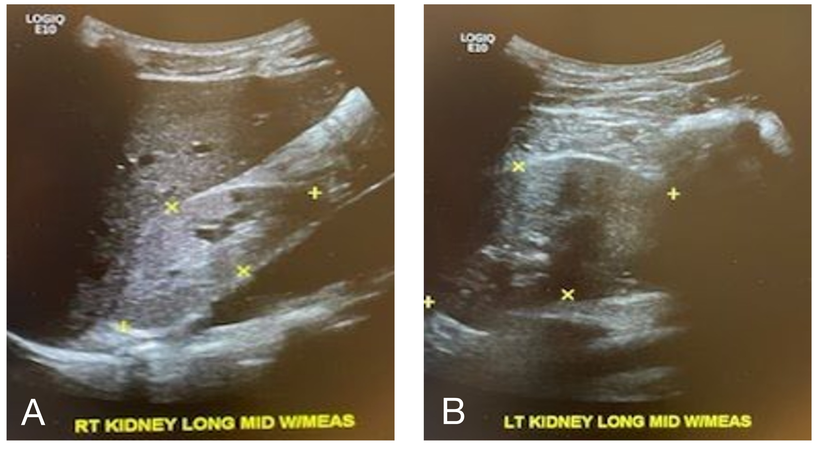

Figure 2. (A) Right kidney: 7.5 cm (normal for age). Increased cortical echogenicity with poor corticomedullary differentiation. Numerous anechoic cysts in the cortex, the largest measuring 9 mm. No renal stone or hydronephrosis. (B) Left kidney: 8.6 cm (normal for age). Increased cortical echogenicity with poor corticomedullary differentiation. Several small renal cortical cysts. No renal stone or hydronephrosis.

Discussion:

Type 1 and type 2 diabetes have been increasing in the pediatric population, especially since COVID. MODY is a rare genetic form of diabetes that is often misdiagnosed as T1 or T2DM. In years past, it was difficult to do genetic testing for all forms of MODY, but now there is a MODY gene panel easily collected via buccal swab through Gene Dx.

MODY 5 is a very rare form of MODY that involves DM and renal disease, which can present with various progressive malformations including renal cysts, dysplasia, tract malformations, or hypoplastic glomerulocystic kidney disease (2). Thus, the patient will be at risk for renal failure and need for renal transplant in the future.

Pediatric endocrinology and nephrology are working together to determine the best treatment options for this patient. There are small studies in the literature concerning the use of glucagon-like peptide 1 (GLP1) agonists and sodium-glucose cotransporter 2 (SGLT2) inhibitors to treat MODY5. Our patient is on an SGLT2 inhibitor which seems to be improving renal function, but not much effect on glucose control. Unfortunately, due to the rarity of this disease, there is still much left to understand about the best methods to treat these patients to help preserve renal function and control their diabetes.

References:

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