

Single Case

Limited Treatment Options in Primary Hyperoxaluria with Renal Failure

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Keywords

Primary hyperoxaluria · Renal biopsy · Chronic hemodialysis · Chronic renal failure · Genetic diseases

Abstract

Primary hyperoxaluria (PH) is a rare autosomal recessive metabolic disorder where serum oxalate levels rise due to overproduction. The kidney tubule is a main target for oxalate deposition, resulting in damage to the organ. Kidney failure is rare in these patients. We present a 67-year-old female with hemodialysis-dependent end-stage renal disease likely due to PH type 2 or 3. With extremely high levels of serum oxalate (60.4 $\mu\text{mol/L}$), this patient had minimal treatment options for her rare disease. This report details a unique presentation of a rare disease where kidney biopsy was instrumental.

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Published by S. Karger AG, Basel

Introduction

Primary hyperoxaluria (PH) types 1, 2, and 3 are autosomal recessive disorders with errors in the metabolism of glyoxylate and oxalate [1]. In these disorders, serum oxalate levels rise due to overproduction. The kidney tubule is a main target for oxalate deposition, resulting in damage to the organ. The incidence of PH is estimated to be 1 in 58,000. Type 1 is the most common form, accounting for approximately 80% of cases. Types 2 and 3 each account for

about 10% of cases [2]. Kidney failure is rare in patients with PH. By comparison, there is increased incidence in secondary hyperoxaluria resulting in advanced chronic kidney injury in the setting of gastric bypass surgery and enteric disorders such as inflammatory bowel disease and short bowel syndrome. Other reports of nonenteric secondary hyperoxaluria are seen in instances of excessive vitamin C ingestion. We present a 67-year-old female with end-stage renal failure likely due to PH type 2 or 3.

Case Presentation

The patient was a 67-year-old female with hemodialysis-dependent end-stage renal disease. The etiology of her renal failure was unclear with no obvious risk factors. She initially presented with a 1-month history of nausea, vomiting, and a 20-pound weight loss. There was no past history of enteric disorders, malabsorption, or use of vitamin supplements. Her serum creatinine was 4.91 mg/dl with a BUN of 81. A kidney biopsy showed oxalate nephropathy (Fig. 1) with tubular atrophy and interstitial fibrosis (Fig. 2). The patient underwent genetic testing for *AGXT*, the mutation seen in PH type 1 [1], and was negative. She is currently on a low-oxalate diet and taking pyridoxine (vitamin B6). However, her plasma oxalate levels remain elevated at 60.4 $\mu\text{mol/L}$ (normal range 1.3–3.1 $\mu\text{mol/L}$) [3]. Despite excellent dialysis adequacy and treatment adherence, her interdisciplinary team concluded her oxalate levels were so high that a kidney transplantation would be likely to have reduced survival.

Discussion

In PH, specific deficiencies of hepatic enzymes cause oxalate overproduction. Oxalate deposits in the kidney tubules can lead to nephropathy and possible kidney failure. Genetic studies aid in the diagnosis of PH, typically showing mutations in the target genes *AGXT*, *GPHPR*, and *HOGA1* for types 1, 2, and 3, respectively. Negative testing for PH type 1 led us to believe our patient has PH type 2 or 3. Diagnosis of PH type 1 would make the patient a potential candidate for combined liver and kidney transplantation. However, treatment for those with end-stage renal disease for PH type 2 and 3 is unclear. Renal transplantation was evaluated although outcomes are poor [4]. Because of this, further genetic testing for types 2 and 3 was deferred because it would not impact clinical decision-making. Her care team is exploring the option of an expanded donor kidney transplantation and this is currently under evaluation. There is a paucity of information in the literature to guide our clinical decision-making in this context. The role for liver transplantation in addition to kidney transplantation remains ambiguous, however it is thought this may be curative because GRHPR enzymatic activity in the liver is high [5], and recent case reports are promising [6]. This case presents a unique diagnostic challenge where kidney biopsy was instrumental.

Statement of Ethics

All treatments and examinations followed the guidance of the Declaration of Helsinki. The subject gave her written informed consent to publish their case (including publication of images).

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

This project was not supported by any grant or funding agencies.

Author Contributions

K. Geiger contributed to acquisition of data and writing of the manuscript. H. Mroch provided supervision and mentorship. Both authors approved the final manuscript.

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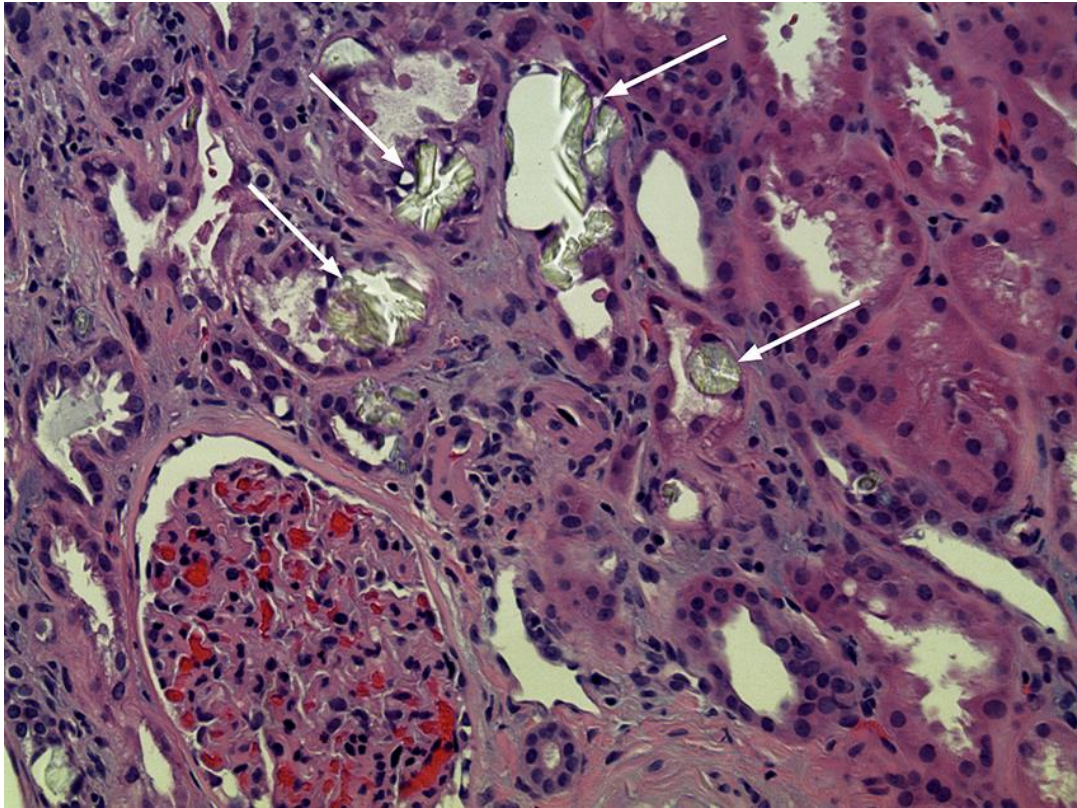


Fig. 1. Kidney biopsy specimen findings at 400× magnification with hematoxylin and eosin stain showing oxalate deposition (arrows) and tubular atrophy.

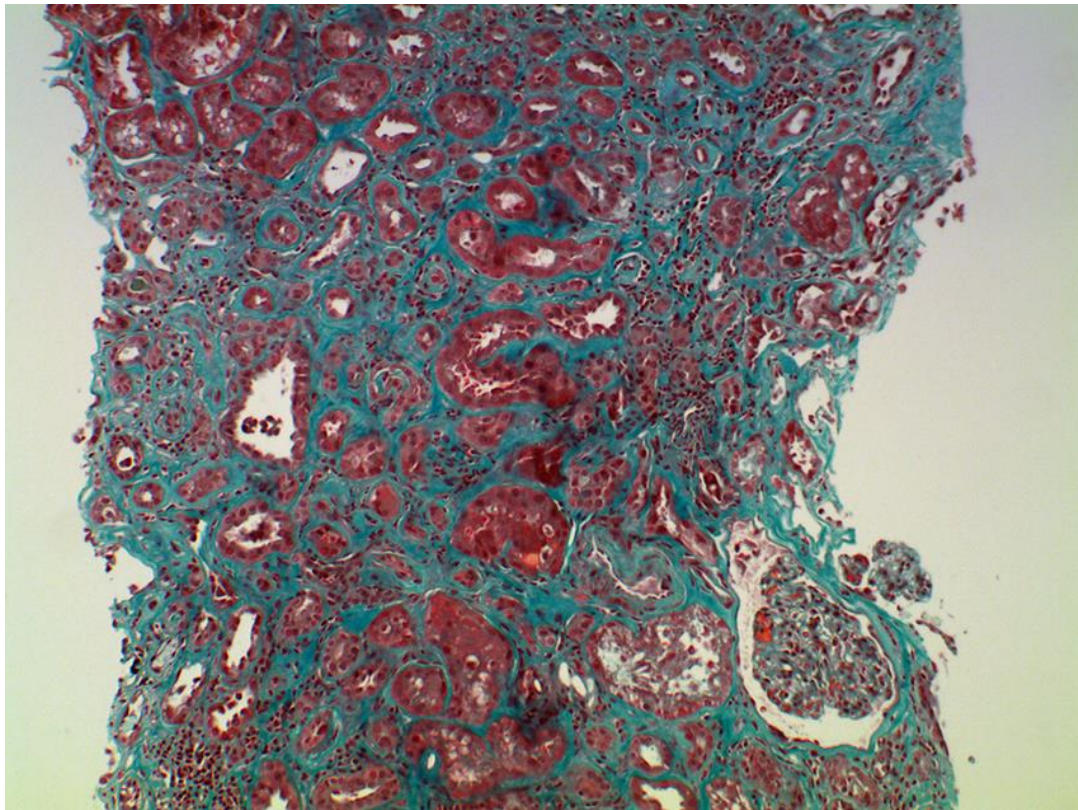


Fig. 2. Kidney biopsy specimen findings at 400× magnification with trichrome stain demonstrating diffuse fibrosis.