Case report

Acute oxalate nephropathy due to high vitamin C doses and exocrine pancreatic insufficiency

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SUMMARY

Oxalate kidney injury can manifest as oxalate nephropathy or nephrolithiasis and present as acute kidney injury or even as end-stage renal disease. There are several known causes for acute oxalate nephropathy; however, the combination of exocrine pancreatic insufficiency with overconsumption of vitamin C has not been described before. In this case, a man in his early 80s presented with anorexia and extreme fatigue for 1 week. He had a history of myalgic encephalomyelitis, also known as chronic fatigue syndrome, for which he took several supplements, including high doses of vitamin C. Furthermore, several years ago, he was diagnosed elsewhere with exocrine pancreatic insufficiency. On admission, acute kidney injury was diagnosed. The kidney biopsy showed oxalate nephropathy as the cause. We diagnosed acute oxalate nephropathy due to high vitamin C doses and exocrine pancreatic insufficiency. Within 14 days, his kidney function got worse and he required renal replacement therapy.

BACKGROUND

Acute oxalate nephropathy is a rare but possible preventable cause of end-stage renal disease (ESRD).[1] Several predisposing conditions have been described, among which intoxication with ethylene glycol, orlistat use, vitamin C overconsumption, an oxalate-rich diet, primary hyperoxaluria and enteral hyperoxaluria.[2] We experienced a case of enteral hyperoxaluria due to exocrine pancreatic insufficiency in combination with vitamin C overconsumption. In patients with exocrine pancreatic insufficiency, it is even more important to avoid other risk factors for acute oxalate nephropathy.

CASE PRESENTATION

A man in his early 80s was diagnosed with myalgic encephalomyelitis 27 years ago by an internist. A week before admission, the patient noticed increased fatigue. Furthermore, he developed anorexia and his fluid intake diminished. He had a history of hypertension, complicated by moderate chronic kidney disease with a serum creatinine of 175 µmol/L. Additionally, for approximately 20 years, he had chronic diarrhoea and was diagnosed with exocrine pancreatic insufficiency in another hospital. His medication included 1000–2000 mg vitamin C, 10 mg amlodipine, 800 IU cholecalciferol, 100 mg ciprofibrate, 2.5 mg clonazepam, 15 mg hydrocortisone, 500 µg IM hydroxocobalamin two times per week, 330 mg levocarnitine, 150 µg levothyroxine, 25 mg liothyronine, 12 mg loperamide, 500 mg mesalazine, 100 mg modafinil, 4 capsules pancreatin, 40 mg pantoprazole, 40 mg simvastatin and a testosterone gel.

On admission, the patient had a blood pressure of 190/80 mm Hg, pulse of 72/min, body temperature of 36.7°C and respiratory rate of 14/min. His speech and movements appeared slow. His central venous pressure was not elevated and he had no pulmonary crepitations or peripheral oedema. He had a midsystolic, 2/6, heart murmur best heard in the pulmonic area.

INVESTIGATIONS

Blood tests revealed a serum creatinine of 1168 µmol/L. Urea level was 48.4 mmol/L. Sodium was 131 mmol/L, potassium was 5.2 mmol/L and C reactive protein was 38 mg/L. Urine tests showed proteinuria (++), erythrocyturia (10/µL) and white blood cells ($0.027x10^9$/L). We confirmed the exocrine pancreatic insufficiency with stool pancreatic elastase, which was 76 µg/g (normal>200 µg/g). The endocrine pancreatic functions were intact. The results of serological evaluation for immunoglobulin, complement, antinuclear antibody and antineutrophil cytoplasmic antibodies were all negative. An abdominal ultrasound showed a higher reflection pattern of the kidney parenchyma without signs of obstruction, but no abnormalities concerning the pancreas or the pancreatic duct. The kidney biopsy presented three glomeruli, of which one was globally sclerosed. No other glomerular abnormalities were seen. The interstitial compartment showed tubulointerstitial nephritis and extensive calcium oxalate tubular depositions revealing an oxalate nephropathy.

TREATMENT

Hydration with saline was performed, but the kidney function did not recover. The patient started haemodialysis 2 weeks later.

OUTCOME AND FOLLOW-UP

The patient did not recover his kidney function. He remained on haemodialysis for 6 months until he decided to discontinue the treatment and subsequently died. Autopsy was not performed. The examinations performed prior to his death did not reveal systemic oxalosis.

DISCUSSION

This is the first case report describing an oxalate nephropathy due to the combination of high oral

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vitamin C doses with an enteral hyperoxaluria due to exocrine pancreatic insufficiency.

The amount of oxalate excretion via the kidneys is dependent on the endogenous metabolism of glycine and ascorbic acid, as well as on exogenous factors, such as the amount of oxalate in the diet and the degree of oxalate absorption in the colon.[2] Normally, calcium binds to oxalate in the gut, preventing a significant amount of absorption by the colon. However, exocrine pancreatic insufficiency leads to fat malabsorption, leaving unabsorbed fatty acids in the colon that bind to calcium. This leaves oxalate free to be absorbed by the colon. Moreover, the non-absorbed fatty acids increase the colonic permeability for small molecules, such as oxalate, which further facilitates oxalate to enter the bloodstream. Then, the kidneys filter oxalate, giving rise to high levels of oxalate in the urine. Oxalate binds to the present calcium, resulting in oxalate nephrolithiasis or oxalate nephropathy.[3] In our case, this form of enteral hyperoxaluria was combined with the intake of high doses of vitamin C, which may be metabolised into oxalate.[4]

There are, to our best knowledge, three previous case reports about acute oxalate nephropathy due to the combination of high vitamin C intake and enteral hyperoxaluria. However, none of these reports includes an enteral hyperoxaluria caused by an exocrine pancreatic insufficiency. Instead, in these cases, the enteral hyperoxaluria is caused by short bowel syndrome with chronic diarrhoea,[5] a high-output ileostomy[6] or a gastric bypass.[7] Comparable to our case, all these cases resulted in ESRD. However, two other reports have been published describing patients with an oxalate nephropathy solely due to high-dose vitamin C, where it was possible to discontinue dialysis after a few months.[8 9]

Our case report has some limitations. First, we were unable to determine the exact amount of vitamin C supplements our patient took. Second, it is unknown why the patient took mesalazine because he was not diagnosed with colitis. According to the patient, this was prescribed for his myalgic encephalomyelitis. The chronic diarrhoea was interpreted as a symptom of the exocrine pancreatic insufficiency. A colonoscopy was not performed.

This case report highlights the importance of regard for the vitamins and supplements patients take. Small dosages of vitamin C supplements are not harmless in healthy individuals, but, especially in patients with other risk factors for oxalate nephropathy, vitamin C supplements can lead to serious and irreversible kidney injury. We encourage clinicians to advise patients with risk factors for oxalate nephropathy, such as enteral hyperoxaluria, to avoid vitamin C supplementation.

Learning points

- High vitamin C doses are a risk factor for end-stage renal disease caused by oxalate nephropathy.
- The risk of an oxalate nephropathy is increased in patients with an exocrine pancreatic insufficiency due to the enteral hyperoxaluria.
- Supplements and vitamins should not be considered harmless when searching for the cause of acute kidney injury.

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