Case Report

Anorexia nervosa: an important cause of chronic tubulointerstitial nephropathy

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Introduction

Brotman et al. [1] reported that in as many as 70% of patients, anorexia nervosa is associated with various renal manifestations, which include decreased glomerular filtration rate, decreased concentrating ability, high blood urea nitrogen, electrolyte abnormalities, urolithiasis, and pitting oedema. A rise in blood urea nitrogen is often disproportionate to that of serum creatinine because of fluid depletion with adequate dietary protein intake.

More than 60 cases with chronic hypokalaemia and clinical nephropathy have undergone renal biopsy [2,3]. The kidney showed chronic tubulointerstitial nephritis, glomerulosclerosis, and juxtaglomerular apparatus hyperplasia [2–6]. Most of these reports have included hypokalaemia of various aetiologies, such as diuretic or laxative abuse. The renal changes in anorexia nervosa have been reported in less than 20 cases [3,4]. In this report, a case with anorexia nervosa, osteoporosis, and chronic interstitial nephritis is presented.

Case

A 33-year-old female was admitted to our hospital for evaluation of hypokalaemia and renal failure. Her family reported that she had had a history of binge eating and vomiting as well as alcohol drinking since the age of 26 years. At age 29 she noted amenorrhoea. She experienced urolithiasis at age 30 years, then a fracture of the right femoral neck at age 31. At age 32 she was found at a regular health checkup to have proteinuria. At age 33 she visited a physician for a gouty attack involving the right first toe. On this occasion renal impairment with a serum creatinine 3.1 mg/dl, hyperuricaemia (17.6 mg/dl) and hypokalaemia (2.0 mmol/l) were noted. She was referred to our hospital. The patient denied taking any medications or health products.

On admission the patient had a height of 163 cm and a weight of 35 kg (body mass index 13.1 kg/m²). Skin turgor was decreased. Blood pressure was 106/60 mmHg without postural changes. Twelve of the teeth had been treated for dental caries. Other physical examinations including neurology were unremarkable.

Urinalysis was positive for blood and protein. The 24-h urinary protein excretion was 0.1–0.3 g. Haematocrit was 30%. Serum total protein was 8.5 g/dl, blood urea nitrogen 34 mg/dl, creatinine 2.6 mg/dl, uric acid 11.2 mg/dl, sodium 136 mmol/l, potassium 2.3 mmol/l, chloride 80 mmol/l, calcium 9.9 mg/dl and phosphate 4.1 mg/dl. Arterial blood showed pH 7.531, pO₂ 77.9 mmHg, pCO₂ 57.4 mmHg, and HCO₃⁻ 48 mmol/l. Endocrinological examination demonstrated intact parathyroid hormone 340 pg/ml (15–50), 1,25-dihydroxy vitamin D 13.6 pg/ml (20–60), plasma renin activity 16 ng/ml/h (2.5–21.4), plasma aldosterone 170 pg/ml (30–159), and angiotensin II 48 pg/ml (10–30). Creatinine clearance was 19 ml/min and urinary chloride was less than 15 mmol/l. Repeated urinary test for furosemide was negative.

Ultrasonography showed a small cyst in the left kidney.

The patient was considered to have anorexia nervosa, hypovolaemia, and chloride-sensitive metabolic alkalosis. After administration of normal saline and acetazolamide, blood urea nitrogen, serum creatinine, and bicarbonate improved to 19 mg/dl, 1.4 mg/dl, and 24 mmol/l respectively. Percutaneous renal biopsy was performed on the 16th hospital day (Figure 1). Three of 15 glomeruli were sclerotic, while eight showed wrinkling of the capillary wall. There were extensive tubular atrophy and interstitial mononuclear cell infiltration. The juxtaglomerular apparatus was hyper-
glomerular and vascular changes, and juxtaglomerular apparatus hyperplasia.

Riemenschneider and Bohle [3], who evaluated 40 patients with hypokalaemic nephropathy including 12 cases of anorexia nervosa, confirmed the equivalent histological findings and found that impairment in renal function was more pronounced when advanced interstitial fibrosis was seen. The role of angiotensin II in the genesis of such interstitial fibrosis remains to be clarified [8]. Mechanism of hypokalaemic nephropathy is speculated to be an ammonia-mediated activation of the alternative complement pathway [9]. Although it is reasonable to assume that those renal morphological changes are due to hypokalaemia per se, it is not clear whether anorexia nervosa itself has different histological characteristics from hypokalaemic nephropathies of other causes.

The number of cases with anorexia nervosa who underwent renal histological evaluation is limited. Apart from the above two reports [2,3], only one case was reported which showed chronic tubulointerstitial changes and non-specific glomerulosclerosis [4]. Many patients have been reported to have hyperplasia of the juxtaglomerular apparatus, which is seen most often in Bartter’s syndrome but also can be observed in patients with other hyperreninaemic status [10]. Although it was not evident in the present case, diuretic and/or laxative abuse often coexist in patients with eating disorders [3]. Also, abuse of other undocumented drugs or health products has to be considered.

Whether anorexia nervosa can cause a distinct variant of chronic tubulointerstitial nephritis remains to be clarified. Clinically, such patients are characterized by low body mass index, dental caries and hypokalaemia. Some other features may support the diagnosis of anorexia nervosa: i.e. osteoporosis, urolithiasis, and renal cysts. Biller et al. [11] indicated that severe spinal osteopenia was present in 50% of patients with anorexia nervosa. Bachrach et al. [10] reported that significant osteoporosis was noted within 2 years of the onset of anorexia nervosa. Urolithiasis is common in patients with anorexia nervosa because of high dietary oxalate intake and chronic dehydration [1,6]. Renal cysts are occasionally seen in cases with prolonged hypokalaemia. Torres et al. [12] reported that 44% of patients with chronic hypokalaemia had renal cysts, which were usually medullary, multiple, and bilateral. In patients with anorexia nervosa who progressed to end-stage renal disease, multiple renal cysts were observed in three of four cases [4].

Bock et al. [2] reported that progressive decline in glomerular filtration rate was associated with duration of hypokalaemia. In a prospective study, Herzog et al. [13] showed that elevated serum creatinine indicated a chronic, prolonged course, i.e. resistance to various therapeutic attempts, as Abdel-Rahman and Moorthy [4] reported four cases that had reached end-stage renal disease.

Halmi et al. [14] found that 19% of female college students had experienced all of the major symptoms of bulimia. In view of this potentially high incidence, plastic. Immunofluorescence was negative for immunoglobulins, complements, or fibrin. Histologically the patient was diagnosed to have chronic tubulointerstitial nephritis. She was transferred to the Department of Psychosomatic Medicine for further treatment.

### Discussion

Prolonged hypokalaemia is known to cause chronic tubulointerstitial nephritis. In 1956 Relman and Schwartz [7] summarized 13 hypokalaemic cases with renal abnormalities including tubular vacuolation, and suggested that hypokalaemic nephropathy is a distinct entity. Bock et al. [2,5] reported 23 cases of hypokalaemic nephropathy, which included nine of anorexia nervosa. In their report, renal histological findings in nine of 23 patients with hypokalaemia of various causes showed hydropic degeneration, atrophy, destruction and regeneration of the tubular cells, damage of the brush border and the basal labyrinth, thickening of the tubular basement membrane, interstitial lymphocytic infiltration, interstitial fibrosis,
Anorexia nervosa and chronic tubulointerstitial nephropathy should always be considered in the differential diagnosis of chronic tubulointerstitial nephropathy, especially when it is accompanied by osteoporosis, urolithiasis, and/or multiple renal cysts.

References


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