Teaching Point
(Section Editor: A. Meyrier)

Hypokalaemia tetraparesis and rhabdomyolysis: aetiology discovered on a normal lung radiograph

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Keywords: distal tubular acidosis; hypokalaemia; nephrocalcinosis; rhabdomyolysis

Introduction

A young woman was referred to Paris from Mayotte, a French island in the Indian ocean, following three life-threatening episodes of hypokalaemic tetraparesis over 8 years. The diagnosis of the underlying disease was made on a plain pulmonary radiograph, which, however, was normal.

Case

A 21-year-old woman was referred to our unit to elucidate the aetiology of three episodes of hypokalaemic tetraparesis that had occurred over the last 8 years. The third episode had led to emergency hospitalization for severe rhabdomyolysis (creatine phosphokinase level up to 20 000 IU/l) associated with life-threatening hypokalaemia (1.21 mmol/l). On her island, the tertiary care facility in which she had been admitted had simply performed measurements of serum electrolytes and had not been impressed by bicarbonate levels of 16 mmol/l that had been attributed to diarrhoea. This was unlikely, however, as the urinary potassium level was 29 mmol per 24 h. She had rapidly recovered with intravenous potassium infusions. She had no salient personal or family history. She had never passed urinary stones. She denied intake of any drug and had a strong dislike of liquorice. When questioned, she remembered that the three episodes of tetraparesis had occurred after a bout of diarrhoea.

On arrival at our hospital she looked healthy. Her blood pressure was 115/60 mmHg and her body weight was 45 kg. Muscular strength and reflexes were normal. Serum creatinine was 97 μmol/l and creatinine clearance derived from the Cockcroft and Gault equation was 67 ml/min/1.73 m². Serum electrolytes were (mmol/l): Na, 141; K, 2.9; Cl, 113; HCO₃⁻, 17; Ca, 2.10; and PO₄ 1.1. Serum albumin level was 39 g/l. Urinary potassium was 50 mmol per 24 h.

The diagnostic work-up included a chest radiograph. The lungs were normal. However, the diagnosis was made on this film, which is shown in Figure 1.

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Published by Oxford University Press on behalf of ERA-EDTA [2005].

Fig. 1. Normal chest X-ray at presentation. However, nephrocalcinosis is seen under the diaphragm.
Below the diaphragm, the kidneys were clearly visible, with nephrocalcinosis, typical of distal renal acidosis.

Radiographs focused on the renal area (Figure 2) were more explicit. They showed a flurry of confluent calcifications.

Urinary citrate excretion was 0.07 mmol per 24 h (normal >1.4). Urinary calcium excretion was 5.2 mmol per 24 h (0.12 mmol/kg body weight). No immunological abnormality was found that could induce distal tubular acidosis. The final diagnosis was that of Albright, type 1, distal tubular acidosis.

The patient was treated with 14 g of citric acid, 10 g of sodium citrate and 4 g of potassium citrate daily. She was sent back to the Indian ocean with normalized serum potassium levels, but she remained moderately acidic, with serum bicarbonate levels in the order of 20 mmol/l. This was attributed to nphron loss and lower than normal glomerular filtration rate, superimposed on renal tubular acidosis (RTA).

Teaching points

1. The syndrome of hypokalemic paralysis covers a heterogeneous group of disorders characterized clinically by hypokalaemia and acute muscle weakness. Most cases are due to familial hypokalemic periodic paralysis. Sporadic cases may be primary, or are associated with other conditions including hyperthyroidism and other endocrinopathies, gastrointestinal potassium losses and renal disorders [1].

2. Hypokalaemic acidosis with urinary potassium levels >20 mmol/l and normal blood pressure are characteristics of a tubular defect [2]. Life-threatening hypokalaemia is not a feature of medullary sponge kidney complicated by RTA.

3. The radiological pattern of nephrocalcinosis observed in Albright’s distal tubular acidosis is usually different from that seen in medullary sponge kidney, which is typically complicated by multiple striated calcifications in the papillae along with small stones [3]. In RTA, the smooth distribution of calcium deposits, equally distributed in all the papillae, is suggestive of the diagnosis. However, the radiological appearance of primary RTA may be indistinguishable from that of medullary sponge kidney.

4. Several systemic diseases may be complicated with tubular acidosis and nephrocalcinosis, such as hypergammaglobulinaemia-associated autoimmune diseases, mostly Sjögren’s syndrome rather than systemic lupus erythematosus (see Table 6 in ref. [4]). They are easily ruled out according to the clinical context and laboratory work-up.

5. The price of a plane ticket from the Comorian islands to Paris (€1566) could have been saved at the expense of a plain abdominal X-ray (€20).

Acknowledgement. We thank Hélène Giraud for her technical assistance in processing the radiographs.

Conflict of interest statement. None declared.

References


Received for publication: 20.4.05
Accepted in revised form: 8.7.05