

Case Report

Osteopetrosis Associated with Hyperkalaemia: A Case Report

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ABSTRACT

Osteopetrosis is a rare disease of childhood. We report a 4-month-old infant with clinical and radiological features of osteopetrosis who had dehydration and

hyperkalaemia on admission and, during investigations, was found to have pseudohypoaldosteronism.

KEY WORDS: hyperkalaemia, infantile osteopetrosis, pseudohypoaldosteronism

INTRODUCTION

Osteopetrosis is a disease of osteoclasts dysfunction resulting in abnormally dense bones. It occurs in two forms: the more severe autosomal recessive or infantile and the more benign autosomal dominant form or tarda^[1]. Diffuse hyperostosis leads to crowding of the bone marrow, resulting in anaemia and extra-medullary hemopoiesis. The bone foramina of the skull fail to enlarge with infant's growth with compression of the cranial nerves. The only treatment available for the infantile osteopetrosis is bone marrow transplantation with appropriately HLA-matched donor^[2]. To the best of our knowledge there is no reported case of an infant with osteopetrosis having associated pseudohypoaldosteronism (PHA).

CASE REPORT

The patient is the first child of consanguineous parents, born at 34-weeks gestation with a birth weight of 1.865 kg. She was found to have anaemia, hepatosplenomegaly with radio dense bones on X-rays typical of osteopetrosis (Fig. 1). There is no history of similar condition in the extended family of both parents. She was given packed erythrocytes and a search for allogenic match donor for bone marrow transplant was not successful. She was admitted for the first time to our hospital at ten weeks with anorexia. She was pale and dehydrated. Her weight was 2.3 kg, and BP was 80/42 mmHg with significant hepato-splenomegaly and normal female genitalia. Neurological examination showed spastic quadriplegia. Investigations: Hb 8.7 g/l, WBC 5300 x 10⁹/l, Platelets 105000 x 10⁹/l, Na 124 mmol/l, K 8.9 mmol/l, Cl 89 mmol/l, Urea 7.8 mmol/l, Creatinine 28 umol/l, pH 7.27, HCO₃

14 mmol/l, pl rennin (PRA) > 2200 mU/L (ref. range 5 - 47), s. aldosterone 2982 pmol/L (ref. range 28-444), 17-hydroxyprogesterone 4.0 nmol/l (ref. range 0.3-14.5), cortisol 493 nmol/l (normal 28 -645 nmol/L). 24-hours urine: Na 38 mmol/l, K 49 mmol/l, and Cl 10mmol/l. ECG showed tall, peaked T waves (Fig. 2). Sweat electrolytes were normal with normal renal ultrasonography. She was treated with intravenous fluids, salt replacement and potassium exchange resins because of persistent hyperkalaemia. Serum electrolytes of the parents were normal.

Twelve months later, she developed mottling of skin and hypotension. A picture of septic shock was noted and all resuscitative measures failed.

DISCUSSION

The patient presented here is a case of osteopetrosis who had normal blood pressure, persistent hyperkalaemia and normal renal functions. The hyperkalaemia produced typical electrocardiographic findings of tall, peaked T waves. This hyperkalaemia was thought to be of renal tubular origin after excluding other causes like renal impairment, congenital adrenal hyperplasia and intake of drugs impairing either mineralocorticoids or tubular transport. In childhood one also should rule out obstructive uropathy^[3], hyporeninemic hypoaldosteronism^[4], chloride shunt syndrome^[5] and pseudohypoaldosteronism. Our patient had hyperkalaemia, high serum aldosterone and rennin levels, normal cortisol and 17-OH progesterone, renal salt loss and normal sweat electrolytes, features that were compatible with PHA type 1. PHA is a rare disorder with target organ unresponsiveness to circulating aldosterone^[6] giving rise to hyperkalaemia, hyponatremia and

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Fig 1, 2. Skull X-ray A/P and lateral view: showing dense base with increased density of the vault and the orbital margins



The disease locus is mapped to chromosome 16p.12.2-13.11 and 12p.13.1 pter. These two chromosomal regions harbor the genes encoding the three subunits of EnaC^[14-16].

In conclusion, this is a rare case of osteopetrosis having associated pseudohypoaldosteronism type 1. PHA type 1 should be considered in the differential diagnosis of hyperkalaemia. Hyperkalaemia is usually asymptomatic but high levels of serum potassium should be treated.

increased urinary salt loss. It can be inherited either as a recessive or dominant trait^[7]. The recessive form (AR) is due to a mutation in epithelial sodium channel (EnaC) and the autosomal dominant form (AD) is due to a mutation in mineralocorticoid receptor gene^[8]. EnaC is an amiloride sensitive protein composed of three units (alpha, beta and gamma)^[9] and mutations in any one of them can cause PHA type 1. EnaC is expressed in the apical membrane of aldosterone tissues like the ducts of sweat and the salivary glands^[10], distal colon, lungs^[11] and in the epithelia of distal nephron^[7]. The AR form is a severe disease involving multiple organs and affected patients have a severe protracted course^[12]. In the AD form, the salt loss involves only the renal tubules and is treated with supplements of salt, which may be discontinued as the condition improves, whether with improvement of the disease or by adaptive increases in dietary sodium chloride^[13]. Intercurrent illnesses, causing volume depletion, due to poor intake or increased fluid loss, interfere with the salt status and the clinical features become apparent. Our patient had the AD form of PHA type 1, involving only the renal tubules, probably a new mutation because the parents' electrolytes were normal. Except for her original disease (osteopetrosis), even with an initial severe course, this patient could have had clinical improvement by two years of age^[8].

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