

Case Report

Neonatal Bartter Syndrome with Early Hyperkalemia: An Unusual Presentation in Twins

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ABSTRACT

A rare case of neonatal Bartter syndrome with atypical onset of early hyperkalemia is reported in a pair of dizygotic twins born at 25 weeks gestation to a Syrian mother. The first twin died with severe hyperkalemia at five days of age and the second

survived with failure to thrive and developmental retardation. This is probably the first case reported from Kuwait. The case is discussed and relevant literature has been reviewed.

KEYWORDS: Bartter's syndrome, hyperkalemia, twins.

INTRODUCTION

Bartter syndrome (BS) is a group of renal tubular disorders characterized by hypokalemia, hypochloremia, metabolic alkalosis, and hyperreninemia with normal BP^[1]. Recent advances in molecular diagnostics revealed three distinct clinical and genetic entities: neonatal Bartter syndrome, classic Bartter syndrome, and Gitelman syndrome^[2].

The neonatal BS is very rare and is characterized by polyhydramnios, polyuria with severe dehydration, failure to thrive, dysmorphic face and hyper-E-prostaglandinaemia^[3,4]. Recently a variant of neonatal BS has been reported from Israel with atypical manifestation of early hyperkalemia^[5]. We are reporting a similar case with severe hyperkalemia in a pair of twins from Kuwait.

CASE REPORT

A pair of twins were born at 25 weeks by vaginal delivery to a 34-year-old Syrian mother who had six abortions and five live children. The parents are first degree cousins and healthy. All five siblings (3 male, 2 female) are well. There was no history of anomalies, mental retardation or early death in near relatives.

During this twins-pregnancy the mother had polyhydramnios, and went into preterm labor; antenatal period was otherwise uneventful.

The first twin was a boy with a birth weight of 900 g, Apgar scores of three and seven at one and five minutes respectively. He was ventilated from birth for hyaline membrane disease (HMD). On day two he developed severe hyperkalemia with typical ECG changes (serum K⁺ 12.5-13.6 mMol/L) which

was treated medically. His hyperkalemia persisted and he developed disseminated intravascular coagulation followed by cardiac arrest. He died at the age of five days.

The second twin was girl, weighing 600 g with Apgar scores of 2 and 6 at one and five minutes respectively. The girl had HMD grade II and was ventilated for seven days. She developed severe hyperkalemia on day two (S.K⁺=9 mMol/L) and treated with IV sodium bicarbonate, insulin with glucose, salbutamol neubilizer, Ca⁺⁺ resonium. Her hyperkalemia persisted for two weeks. The serum aldosterone and rennin were very high (> 3300 pmol/L and > 2500 munit/L respectively. Normal values are 111-862 pmol/L and 7-76 munit/L respectively). S. Na⁺, Ca⁺⁺ and urine 17-OH progesterone levels were normal. Her karyotype was normal female (46XX). Her urine electrolytes were also normal.

From second week onwards she developed prolonged fever probably due to polyuria and dehydration. The clinical course was further complicated by broncho-pulmonary dysplasia, retinopathy of prematurity, patent ductus arteriosus, arrested hydrocephalus and hypertrophic cardiomyopathy.

During the third week she gradually developed hypokalemia (S. K⁺ = 2.4 mMol/L) along with hyponatremia (serum Na⁺ = 124 mMol/L) and hypocalcemia (S. Ca⁺⁺ = 1.6 mMol/L) despite normal intake of these electrolytes. These were corrected by IV supplements of Na⁺, K⁺ and Ca⁺⁺. Urine Na⁺, K⁺ and chloride were high. At four months of age her serum level of aldosterone and rennin were found to be very high (> 3300 pMol/L

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Fig. 1: showing dysmorphic features of neonatal Bartter syndrome

and >1900 mU/L respectively). The diagnosis of Bartter syndrome was considered and treatment started with supplemental oral sodium chloride and potassium citrate giving 5 mmol Na^+ and 3 mmol K^+ /Kg/day; but remained partially controlled due to non-compliance.

She is presently two years old (corrected age 20 months) with weight at 5.1 Kg, head circumference 41 centimeters, height 68.5 centimeters (all below 3rd centile). She had severe developmental retardation (Developmental Quotient was 25 for age). Ultra sound of the abdomen shows normal sized kidney but increased echogenicity due to nephrocalcinosis.

DISCUSSION

Bartter syndrome was originally described by Bartter and colleagues in 1962. An autosomal recessive mode of inheritance is observed in some patients, although many cases are sporadic. The underlying renal abnormality results in excessive urinary losses of sodium, chloride and potassium^[1].

The neonatal form of the disease can be suspected before birth or diagnosed immediately after birth by maternal polyhydramnios, secondary to fetal polyuria, and is evident by 24-30 weeks of gestation. Delivery often occurs before term. The

newborn has massive polyuria. The subsequent course is characterized by life-threatening episodes of fluid loss, clinical volume depletion, fever and failure to thrive^[6]. Our case also had all these features. Dysmorphic features like triangularly shaped face, prominent forehead, large eyes, protruding ears, drooping mouth and Strabismus are described in neonatal BS^[3]. This was also present in our case (Fig. 1).

Two main types are described in the neonatal variety of BS. In type I, mutations in the sodium-chloride potassium-chloride cotransporter gene (locus SLC12A1 on chromosome bands 15q15-21) occur while in type II, mutations occur in the ROMK gene (locus KCNJ1 on chromosome bands 11q24-25)^[2].

Muranjan *et al* (2002) reported the absence of typical features and hypokalemia in early neonatal period^[2] but Finer *et al* (2003) reported for the first time that early postnatal hyperkalemia, sometimes severe, may complicate neonatal BS associated with ROMK mutations^[5]. Its association with hyponatremia and hyperreninemic hyperaldosteronism may erroneously suggest the diagnosis of pseudohypoaldosteronism type 1. Plasma potassium was as high as 9.0 ± 1.2 mmol/L and sodium as low as 124 ± 3.5 mmol/L, appearing usually at day 3 of life and normalizing by the end of the first postnatal week^[5]. Our cases even had more severe hyperkalemia, and were confused with pseudohypoaldosteronism. The first twin died of persistent hyperkalemia despite treatment. Peritoneal dialysis might have saved this baby but it was not feasible due to its low birth weight.

A renal sonogram may reveal nephrocalcinosis in neonatal Bartter syndrome. Hydronephrosis and hydroureter secondary to chronic polyuria may also be evident. Cardiac arrhythmia and sudden death may result from electrolyte imbalances. Chronic hypokalemia results in slow progression to chronic renal insufficiency^[6]. Our case also had developmental retardation, failure to thrive, fever and early nephrocalcinosis.

The cornerstones of medical therapy are the administration of indomethacin and potassium supplementation. Therapy improves the patient's clinical condition and allows growth^[7]. Our case was complicated because of non-compliance to oral supplements and indomethacin and, poor follow-up.

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