Acquired Bartter-Like Phenotype

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Abstract

We present a case of middle-aged man who presented with sudden onset of weakness of both upper and lower limbs with hypotension and polyuria without any antecedent illness. Investigations showed severe hypokalemia, hypercalciemia, hyponatremia, mild hypomagnesemia, hypercalciuria, metabolic alkalosis and increased plasma renin and aldosterone levels in the blood suggesting Bartter syndrome. Thus a diagnosis of acquired Bartter-like phenotype was made.

Introduction

Bartter syndrome is a rare autosomal recessive disorder affecting the function of the thick ascending limb of the loop of Henle, giving a clinical picture of salt wasting and hypokalemic metabolic alkalosis described in 1962 by Bartter and co-workers.¹

Most of the cases present antenatally or in neonates. Metabolic abnormalities include hypokalemia, hyperchloremic metabolic alkalosis, decreased urinary concentrating and diluting ability, hypercalciuria with nephrocalcinosis, mild hypomagnesemia, and increased urinary prostaglandin excretion and blood pressure is normal or low.²

Adult-onset Bartter syndrome is very rare. Few cases reported showed its association with chronic sialoadenitis,³ pulmonary tuberculosis⁴ and exposure to aminoglycosides like gentamycin.⁵ According to best of our knowledge, so far, very few cases have been reported in India.⁶

Case Presentation

A 40 year old male presented to us with sudden onset of weakness of both upper limbs and lower limbs of 8 days duration. He had both proximal and distal muscle weakness with no sensory symptoms and bladder bowel disturbances. He was having similar episodes of fever, muscle cramps and mild weakness since 6 months for which he was treated for viral fever with polyarthralgia. There was no history of any drug abuse or pulmonary tuberculosis or gastrointestinal losses.

On examination, patient was conscious with GCS 15/15. He had hypotension with a blood pressure 90/60 mmHg. Neurological examination showed normal higher mental function and cranial nerves. Motor system examination showed hypotonia of all four limbs with power of 3/5 and absent deep tendon reflexes and bilateral mute plantar response. There was no sensory and autonomic system involvement. Initially, differential diagnosis included GBS syndrome, hypokalemia and diuretic abuse.

Patient was investigated, serum electrolytes showed severe hypokalemia (0.7 mEq/L), hypocalcemia (2.4 mg%), hyponatremia (108 mEq/L), mild hypomagnesemia (1.0 mg/dl) and urine output was 4 litres/day. He was given i.v. potassium, calcium and normal saline infusion. Patient did not improve and repeat electrolytes showed no improvement. He was then evaluated for serum bicarbonates, urinary electrolytes, thyroid function tests, plasma renin and aldosterone levels. The tests showed increased urinary excretion of electrolytes including hypercalciuria, metabolic alkalosis with increased plasma renin and aldosterone levels and a normal thyroid function (Table 1). ECG showed non-specific changes. MRI of cervical spine showed insignificant cord compression as opined by neurosurgeon.

Patient was treated aggressively with calcium, potassium and magnesium supplements. Daily investigations are shown in Table 2. Patient showed improvement with regaining power of 5/5 on day 5. Patient’s electrolytes improved with supplemenations though never reached normal levels. Patient was discharged with advice for regular follow up.

Discussion

Bartter syndrome is a rare autosomal recessive disorder resulting from mutations affecting any of the five ion transport proteins in thick ascending loop of Henle, giving a clinical picture of salt wasting and hypokalemic metabolic alkalosis. Metabolic abnormalities include hyponatremia, hypokalemia, hyperchloremic metabolic alkalosis, hypercalciuria, mild hypomagnesemia, increased urinary prostaglandin excretion and increased plasma renin and aldosterone levels.

There is loss of the lumen-positive electrical transport potential that normally drives the paracellular reabsorption of sodium, calcium, and magnesium causing NaCl wasting, hypercalciuria, and mild hypomagnesemia in thick ascending loop of Henle (TAL). Hypovolemia from impaired sodium and chloride reabsorption in either the TAL or the DCT activates the renin-angiotensin-aldosterone system (RAAS). The clinical syndrome mimics the effects of chronic ingestion of a loop diuretic.

It presents most commonly in antenatal or neonatal period. Adult onset cases are very rare, seen in cases of diuretic abuse. Association with chronic sialoadenitis, pulmonary tuberculosis and exposure to gentamycin have been reported.

In our case, patient was a 40 yr old middle-aged male who presented with quadriplegia. There was no history of any drug or diuretic abuse, pulmonary tuberculosis or gastrointestinal losses. He also had polyuria and hypotension. Neurological examination revealed hypotonia of all four limbs with absent deep tendon reflexes. Initially GBS was suspected but there was no preceding gastrointestinal illness.
no upper respiratory infection, no cranial nerve involvement or any autonomic dysfunction. Other differential diagnosis of electrolyte disturbances like hypokalemia was also considered. Initial investigations showed hyponatremia, hypokalemia, hypocalcemia, hypomagnesemia and hypocloremia. On further investigations, revealed hypercalciuria and metabolic alkalosis with increased renin and aldosterone levels which was consistent with Bartter-like phenotype.

As there was no history of any diuretic abuse or gastrointestinal losses, Bartter-like phenotype was considered. As reported in other cases, few Bartter-like phenotype were seen due to exposure to gentamycin or in association with pulmonary tuberculosis or sialoadenitis. In our patient as there was no other history or findings revealing any underlying condition, we reported it as an acquired idiopathic Bartter-like phenotype.

In contrast, Gitelmans is a disorder affecting distal tubule diagnosed at a later age and is associated with hypocalciuria, hypomagnesemia and predominant muscular signs with no signs of volume depletion, no polydipsia and polyuria and normal urinary prostaglandin E2 levels.2

Treatment includes lifelong therapy with potassium and magnesium supplements and liberal salt intake. High doses of spironolactone or amiloride can be used. Nonsteroidal anti-inflammatory drugs (NSAIDs) reduce the polyuria and salt wasting. Indomethacin is widely used. Angiotensin I converting enzyme inhibitors have been used successfully in conjunction with potassium supplements.1

<table>
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<tr>
<th>Serum</th>
<th>Day 4</th>
<th>Day 5</th>
<th>Day 6</th>
<th>Day 7</th>
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References