

Case Report

Two Cases of Hypokalaemic Periodic Paralysis due to Conn's Syndrome

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Abstract:

Aldosterone producing adenoma, also known as Conn's syndrome, is the most common secondary form of hypertension. Conn's syndrome is characterized by hypertension with increased aldosterone, low renin, hypernatremia and hypokalaemia. Clinical manifestations include hypertension in young or resistant hypertension, generalized weakness and fatigue. Here we report two cases presenting with hypokalaemic periodic paralysis and ultimately diagnosed as primary hyperaldosteronism due to Conn's syndrome.

Keywords: *Conn's syndrome, hypokalaemic periodic paralysis, Hypertension.*

Introduction

Hypokalaemic periodic paralysis is an uncommon disorder characterized by transient attacks of flaccid paralysis of varying intensity and duration¹. Most of the cases are familial but several sporadic cases of different etiologies have been reported including rare cause like primary hyperaldosteronism. Primary hyperaldosteronism is characterized by increased aldosterone secretion which would clinically manifest as hypertension, hypokalaemia and was first describe by J. W. Conn in 1955². The common causes of primary hyperaldosteronism are, bilateral adrenal hyperplasia or aldosterone producing adenoma, also known as Conn's syndrome, and less common causes are due to unilateral adrenal hyperplasia, aldosterone producing adrenocortical carcinoma or familial hyperaldosteronism³. Here we report two cases of Conn's Syndrome presented with hypokalaemic periodic paralysis.

Case report 01

A 35-year-old male, hypertensive for 10 years, was admitted in Internal Medicine department of Dhaka Medical College and Hospital (DMCH) with complaint of recurrent weakness of all four limbs for last 1 year. Weakness first appeared in

both lower limbs, symmetrical and progressively involved both upper limbs with next 4 hours. He had no respiratory or swallowing difficulty and he denied any history of upper respiratory tract infection or diarrhoea. The weakness had no relation with taking carbohydrate meal and alcohol and he had no family history of hypertension. He gave history of 3 similar episodes in last 1 year. Weakness persisted for about one to three days and recovered spontaneously.

General physical examination revealed pulse: 80 beats/min, blood pressure: 150/90 mm of Hg (with Losartan potassium 50 mg once daily), respiratory rate: 14 breaths/min. No jugular venous distension, goitre or lymphadenopathy was present. Neurologic examination revealed flaccid paralysis of all extremities which involved both proximal and distal muscles. Muscle power was MRC grade 2/5 in lower limbs and 3/5 in upper limbs. Deep tendon reflexes were absent, sensation was intact in all four limbs.

Investigations showed serum Sodium 143 mmol/L, Potassium 1.3 mmol/L, Chloride 71 mmol/L, Magnesium 1.6 mg/dl, corrected Calcium 8.8 mg/dl, Albumin 42 gm/dl and s. creatinine 1.5 mg/dl. 24 hour urinary electrolytes showed sodium 117 mmol, potassium 22 mmol, chloride 140 mmol. ECG showed flattened T wave, prominent U wave, prolonged PR and QRS duration suggestive of hypokalaemia. Thyroid and liver functions were normal. Arterial blood gas analysis revealed metabolic alkalosis (pH: 7.57, HCO₃⁻: 50, PCO₂: 53). USG of whole abdomen and echocardiogram were normal. In view of hypertension, hypokalaemia and metabolic alkalosis, serum aldosterone and plasma renin activity were measured after normalizing plasma potassium level. Serum aldosterone was 266 pg/ml (Normal: 20-180 pg/ml) and plasma renin was 2.98 pg/ml (Normal: 4-37.5 pg/ml) and aldosterone and renin (PAC/PRA) ratio were 91.72, compatible with the diagnosis of primary hyperaldosteronism. Aldosterone suppression test with saline infusion revealed non-suppressible serum aldosterone with level of 272.5 pg/ml (Normal: 20-180

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pg/ml). To find out the cause contrast enhanced MRI of whole abdomen was performed and showed well defined lobulated lesion measuring about 12×17×16 mm involving body and medial limb of left adrenal gland with mixed signal intensity suggestive of adrenal adenoma. A final diagnosis of Conn's syndrome with a rare presentation of hypokalaemic periodic paralysis was made.

Surgery was planned for adrenal adenoma. Patient was managed pre-operatively with Amlodipine 5mg and Spironolactone 200mg daily with potassium supplementation. After medical treatment patient's serum potassium was 3.9 mmol/L and blood pressure was well controlled. He underwent laparoscopic left adrenalectomy and histopathological findings were consistent with adrenal adenoma. Post-operatively patient's blood pressure and serum potassium level were well controlled without any drug. Now patient is doing well without any medication.

Case report 02

A 43-year-old female, hypertensive for 20 years, got admitted in Medicine department of DMCH with complaints of recurrent weakness of all four limbs and recurrent hypokalaemia for last 3 years. She was diagnosed as a case of hypokalaemic periodic paralysis with essential hypertension and she was prescribed with tab. Olmesartan 40 mg, tab. Spironolactone 50 mg along with occasional potassium supplementation. But she was irregular with her medications. This time she presented with severe weakness of all four limbs. Weakness first appeared on her lower limbs then involved upper limbs. She denied any respiratory or swallowing difficulty. No history of respiratory tract infection or diarrhoea. She gave history of 10 similar episodes in last 3 years, each persisted for about 1-2 days, not associated with taking carbohydrate meal and resolved after taking potassium syrup and potassium containing diet.

General physical examination revealed pulse: 72 beats/min, blood pressure: 160/90 mm of Hg (with Olmesartan 20 mg twice daily), respiratory rate: 14 breaths/min. There was no jugular venous distension, goitre or lymphadenopathy. Neurologic examination revealed flaccid paralysis of all extremities which involved both proximal and distal muscles. Muscle power was MRC grade 2/5 in lower limbs and 3/5 in upper limbs. Deep tendon reflexes were absent, sensation was intact.

Investigations showed serum sodium 143 mmol/L, potassium 2.7 mmol/L, chloride 103 mmol/L, and s. creatinine 0.68 mg/dl. Twenty four hour urinary electrolytes showed sodium 224 mmol, potassium 79 mmol, and chloride 285 mmol. ECG showed flattened t wave, and prolonged PR interval and QRS duration suggestive of hypokalaemia. Thyroid and liver functions were normal. Arterial blood gas analysis revealed metabolic alkalosis (pH: 7.50, HCO₃: 44, PCO₂: 48). USG of whole abdomen and echocardiogram were normal. In view of hypertension, hypokalaemia and metabolic alkalosis, an overnight dexamethasone suppression test was done which was normal. Serum aldosterone and plasma renin activity were measured after normalizing plasma potassium level.

Serum aldosterone was 404 pg/ml (Normal: 20-180 pg/ml) and plasma renin was 2.92 pg/ml (Normal: 4-37.5 pg/ml) and aldosterone and renin (PAC/PRA) ratio were 138, compatible with the diagnosis of primary hyperaldosteronism. Aldosterone suppression test with saline infusion revealed non-suppressible serum aldosterone with level of 305 pg/ml (Normal: 20-180 pg/ml). To find out the cause contrast enhanced MRI of whole abdomen was performed and showed well defined lobulated lesion measuring about (2.5 cm× 1.8 cm) involving left adrenal gland with mixed signal intensity suggestive of adrenal adenoma. The final diagnosis is Conn's syndrome with a rare presentation of hypokalaemic periodic paralysis.

Left adrenalectomy was planned and patient was managed pre-operatively with Amlodipine 5 mg and spironolactone 300 mg daily with potassium supplementation. After medical treatment patient's s. potassium was 4.2 mmol/L and blood pressure was well controlled. He underwent laparoscopic left adrenalectomy and histopathological findings were consistent with adrenal adenoma. Post-operatively patient was doing well, and her blood pressure and serum potassium level were well controlled without any drug.

Discussion

Hypokalaemic periodic paralysis is a neuromuscular disorder that occurs due to defect in the ion channels of skeletal muscles⁴. Hypokalaemic periodic paralysis clinically manifested as sudden and transient development of muscle weakness. Weakness initially appeared in both lower limbs and subsequently involve both upper limbs. This flaccid type of weakness may precipitate by heavy carbohydrate meal or physical exercise. Each episode usually last for few minutes to several days. Weakness usually resolves spontaneously but sometimes may needs potassium supplementation.

Recent information suggest that Primary hyperaldosteronism (PA) is one of the commonest causes of secondary hypertension and commonly occurs between age 30 and 50 years of age⁵. Causes of primary hyperaldosteronism includes bilateral adrenal hyperplasia (60%), unilateral adenoma (30%), unilateral adrenal hyperplasia (2%), familial hyperaldosteronism (1%) and adrenal carcinoma with aldosterone hypersecretion (<1%). Excess aldosterone causes increases sodium reabsorption and potassium secretion that results in hypertension with hypernatraemia and hypokalaemia⁶. Both of our patients presented with young onset hypertension with recurrent hypokalaemic periodic paralysis, which is very uncommon presentation of Conn's syndrome.

Diagnostic approach includes measurement of plasma aldosterone concentration (PAC) and plasma renin activity (PRA) with calculation of PAC/PRA ratio. PAC/PRA ration more than 23.6 is diagnostic of PA with a sensitivity 97% and specificity of 94%⁷. Drugs interfering with RAAS should be discontinued at least 4 to 6 weeks before examination⁸. In our series of case reports PAC/PRA ratio were 91 and 138 respectively, that is diagnostic of PA. It was further confirmed by saline load test, which failed to suppress plasma

aldosterone level. Hydrocortisone suppression test is rarely performed now-a-days.

Detection of disease subtypes includes imaging with contrast MRI or CT, adrenal vein catheterization with venous sampling and genetic screening for familial disease.

Therapeutic approach, in unilateral form of PA is preferably adrenalectomy while bilateral diseases are treated with aldosterone receptor antagonist. Our patients were initially treated with spironolactone and amlodipine. Both of the patients underwent laparoscopic adrenalectomy and in post-operative follow-ups they remain normotensive without any medications.

Conclusion:

Young onset hypertension with persistent or recurrent hypokalaemia should trigger the suspicion of PA. Hypokalaemic periodic paralysis is very uncommon presentation of Conn's syndrome. Initially treated with Aldosterone Receptor Antagonist (ARA) and finally, the definitive treatment is adrenalectomy. Early detection is relevant for the institution of curative treatment and reduction of associated mortality and morbidity.

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