A case of hyperkalaemic hypertension

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Case History:

A 41 year old man was found to have high blood pressure of 220/100mmHg during a routine health check-up for medical insurance. Echocardiography showed trivial tricuspid regurgitation. Renal ultrasound, renal perfusion scan and chest radiograph were normal. Despite multiple antihypertensive agents over seven years (including atenolol, amlodipine, doxazosin and lisinopril) his blood pressure was consistently above 150/90mmHg. During this period, his serum potassium levels were high between 5.8-6.6mmol/L and he also required treatment for renal stones with lithotripsy.

Investigations and method:

Further investigation revealed that the patient had hyperchloraemic metabolic acidosis (Chloride 113mmol/L [96-106], Bicarbonate 21 mmol/L [22-30]) and hypercalciuria (24 hour urine calcium 14.9 mmol [2.5-7.5]). Renal function, renin and aldosterone levels were normal. His mother and sister were also noted to have hypertension and hyperkalaemia.

Results and treatment:

The history of familial hypertension and hyperkalaemia were consistent with a diagnosis of pseudohypoaldosteronism type 2 (PHA2). Hypercalciuria occurs in PHA2 associated with WNK4 gene mutations and sequence analysis identified a novel heterozygous missense mutation in our patient. Treatment was switched to bendroflumethiazide 2.5mg once a day. His blood pressure is now well controlled below 140/80mmHg, and his hyperkalaemia, hyperchloraemic metabolic acidosis and hypercalciuria have reverted to normal.

Conclusions and points for discussion:

WNK4 is exclusively expressed in the distal renal tubule. Mutations in this gene affect the function of the thiazide sensitive Na-Cl co-transporter (NCC) in the distal renal tubule and the renal outer medullary potassium (ROMK) channels. The result is an excess of sodium and chloride reabsorption, hyperkalaemia and hypercalciuria. Hypertension management is improved with thiazide treatment, which also reverses the biochemical abnormalities of hyperkalaemia, hyperchloraemic metabolic acidosis and hypercalciuria.