Title

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CLINICAL VIGNETTE

Primary Aldosteronism Presenting with Resistant Hypertension & Severe Hypokalemia

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Case Presentation

A 61-year-old female with resistant hypertension was referred to endocrine for hypokalemia and management of hypertension. She was taking losartan-hydrochlorothiazide 100-12.5 mg daily, nebivolol 10 mg daily, and felodipine 10 mg daily. She had prior hypokalemia and was prescribed potassium chloride ER 40 mEq daily, but discontinued potassium due to gastrointestinal discomfort and worsening gastroesophageal reflux disease (GERD). Hypokalemia of 2.4 mmol/L was found by her primary care physician and she restarted daily repletion with potassium chloride ER 60 mEq/day and was referred for endocrine consultation.

She denied any family history of hypertension or hypokalemia. On initial physical exam, she appeared well-nourished and was an excellent historian. Her vital signs included: Blood pressure 164/93 mmHg, pulse 74, temperature 36.8 °C (98.2 °F) (Oral), height 5' 6" (1.676 m), weight 194 lb (88 kg), SpO2 97%, BMI 31.31 kg/m².

Head and neck exam was without Cushinoid features. Lungs, Cardiac and Abdominal exams were unremarkable and skin was without striae and lower extremities were free of edema

Initial am laboratory tests, drawn in a seated position showed plasma aldosterone concentration (PAC) of 20 ng/dl and plasma renin activity (PRA) <0.167 ng/ml/hr with PAC/PRA ratio (PRR) of 119.76. Chemistries included sodium 142 mmol/L, potassium 3.6 mmol/L, ACTH 28.3 pg/mL, cortisol 14 mcg/dL, creatinine 0.78 mg/dL, GFR 82 mL/min/1.73. These laboratory values were highly suspicious for primary aldosteronism and further confirmatory testing was unnecessary. She was initiated on short term trial of spironolactone, 50 mg daily with significant improvement in blood pressure control and hypokalemia.

To subtype primary aldosteronism and localize possible adrenal tumor, adrenal computer tomography scan (CT) with and without contrast was obtained. Adrenal CT revealed two right adrenal masses on medial and lateral right limbs measuring 14 x 10 mm and 10 x 8 mm respectively. There was also thickening of the medial limb of the left adrenal gland, without distinct nodule.

Because of bilateral adrenal abnormalities, adrenal vein sampling was scheduled for localization. Spironolactone was discontinued prior to adrenal vein sampling. Diagnostic Interventional Radiology performed adrenal vein sampling with Cosyntropin infusion. Right adrenal vein: aldosterone 15616 ng/dL, cortisol =288 mcg/dL. Left adrenal vein: Aldosterone 122 ng/dL, cortisol 404 mcg/dL. Peripheral vein: aldosterone 116 ng/dL, cortisol 36 mcg/dL. These results favored a right adrenal dominant source for hyperaldosteronism

She was referred to Endocrine Surgery for elective laparoscopic right adrenalectomy.

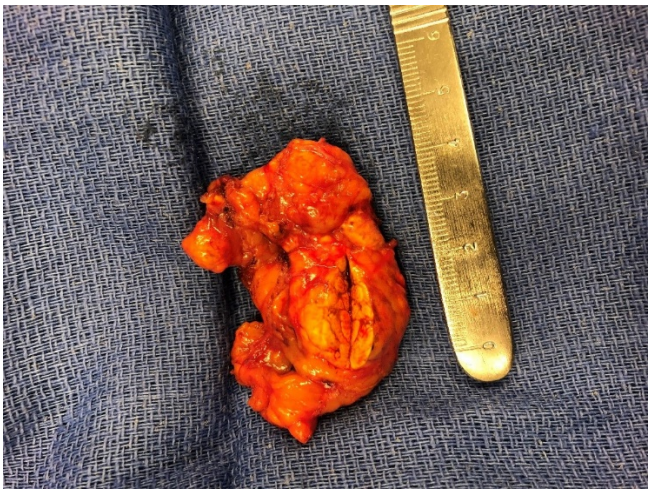

Figure 1. Larger right adrenal nodule.

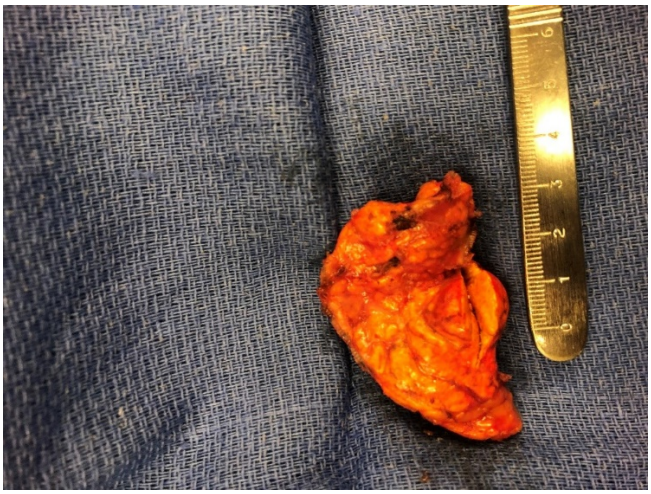

Figure 2. Smaller right adrenal nodule.

Postsurgical pathology confirmed presence of 2 cortical adrenal gland nodules measuring 1.5 x 1.0 x 1.0 cm (Figure 1) and 1.5 x 1.0 x 0.9 cm (Figure 2) consistent with adrenocortical hyperplasia. The former also contained foci of myelolipomatous metaplasia. Postoperatively, blood pressure return to normal and spironolactone and other hypertension medications were discontinued. Also, potassium supplement was discontinued and potassium remained normal without supplement at 3.7 mmol/L. PAC returned to normal at 4.9 ng/dl and PRA to 0.4 ng/mL/hr.

Discussion

Secondary hypertension, a term used for hypertension attributable to an identifiable cause, accounts for 10% of all patients with hypertension.[1] Primary hyperaldosteronism, is one cause of secondary hypertension arising from aldosterone-producing adenomas. It is characterized by resistant hypertension, requiring greater than three antihypertensives, hypokalemia and metabolic alkalosis from excess aldosterone production and suppression of plasma renin activity. Primary hyperaldosteronism may present as several types. The most common types are idiopathic hyperaldosteronism (60%–66%) and aldosterone-producing adenoma (APA) (30%–35%). The other remaining forms include primary adrenal hyperplasia, familial hyperaldosteronism syndrome type 1 or 2, adrenocortical carcinoma, or ectopic aldosterone production which are very rare.[2]

Primary aldosteronism should be suspected when PRA is suppressed to <1 ng/mL/hr and PAC is ≥10 ng/dL. The PRR is usually >20 ng/dL per ng/mL/hr. In general, a PAC/PRA ratio greater than 20 (depending upon the laboratory ranges) is considered suspicious for primary aldosteronism, although others use a cutoff criterion of 30.[3-6] Most patients require confirmatory testing. Among patients with hypertension and an elevated plasma aldosterone concentration (PAC) ≥10 ng/dL and low renin (PRA) <1 ng/mL/hr the results may suggest either primary aldosteronism (high PAC, low PRA), secondary hyperaldosteronism (high PAC and nonsuppressed PRA), or nonaldosterone mineralocorticoid excess (low PAC, low PRA). In most patients, the diagnosis of primary aldosteronism must be confirmed by demonstrating inappropriate aldosterone secretion with one of several tests including "Oral sodium loading". The exception to the requirement for confirmatory testing is the patient with spontaneous hypokalemia, undetectable PRA, and a PAC ≥20 ng/dL. In this clinical setting, primary aldosteronism is the only diagnosis to explain these findings. Since our patient demonstrated spontaneous hypokalemia, undetectable PRA, and a PAC ≥20 ng/dL, no confirmatory test was needed.

Adrenal CT scan is used to subclassify primary aldosteronism and localize possible adrenal tumor. When a solitary, hypodense, unilateral macroadenoma (>1 cm) and normal contralateral adrenal morphology are found in a young patient (<35 years of age) with vigorous primary aldosteronism, unilateral adrenalectomy is a reasonable treatment. For patients who would like to pursue surgical management (unilateral adrenalectomy) of their primary aldosteronism, should undergo adrenal vein sampling (AVS) to confirm unilateral disease if the CT scan is normal, shows bilateral abnormalities, or shows a unilateral abnormality with patients over age 35 years.[7] Adrenal computer tomography scan (CT) with and without contrast showed two distinct nodules on right adrenal as well as thickening of the medial limb of the left adrenal gland. Adrenal vein sampling confirmed right adrenal dominant source for hyperaldosteronism after successful catheterization.[8] Laparoscopic surgery was successful with rapid resolution of hyperaldosteronism, hypertension and hypokalemia.

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