

Case Report: Hyperparathyroidism in a Patient with Aldosterone-producing Adenoma

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ABSTRACT

Background: The primary aldosteronism (PA) is one of the secondary hypertension causes. The classic presenting signs are hypertension (HTN) and hypokalemia.

Objectives: The study aimed to differentiate between aldosterone-producing adenoma (APA) which is surgically curable and the bilateral adrenal hyperplasia (BAH) which is medically treatable.

Material and methods: A case study of a 35 years old Saudi male patient referred from primary health care center with uncontrolled HTN.

Results: In presence of hypertension, hypokalemia and metabolic alkalosis, the primary aldosteronism should be suspected. Patients with PA, a challenging task is to differentiate between aldosterone-producing adenoma (APA) which is surgically curable and the bilateral adrenal hyperplasia (BAH) which is medically treatable. The differentiation usually require adrenal venous sampling however it is costly, invasive, with high risk and not available in most of centers. There is relation between elevated parathyroid hormone and APA in patients with biochemically confirmed primary aldosteronism.

Conclusion: In patients with confirmed PA, routine assessment of serum parathyroid hormone may be helpful to identify those who are more likely to have APA, which is treated surgically before the adrenal venous sampling.

Keywords: Hyperparathyroidism, Primary aldosteronism, Adenoma.

INTRODUCTION

The primary aldosteronism (PA) is one of the secondary hypertension causes. The classic presenting signs are hypertension and low potassium level. The most common PA etiology are:

- Aldosterone producing adenoma (APA).
- Bilateral idiopathic hyperaldosteronism.

It is important to diagnose the PA because of its prevalence and its association with a higher rate of cardiovascular morbidity and mortality⁽¹⁰⁾.

Case detection by measuring plasma aldosterone and renin activity or renin concentration should be done in patients with a relatively high prevalence of PA. The PA has higher prevalence in patients with hypertension than before. Normokalemic hypertension is more common presenting sign in patients with PA than hypokalemic hypertension which appeared in more widespread testing^(1, 5, 11 & 12).

In patients with PA, a challenging task is to differentiate between APA which is surgically curable and the bilateral adrenal hyperplasia (BAH) which is medically treatable. The differentiation is usually required adrenal venous sampling however it is costly, invasive, with high risk and is not available in all centers.

Case Presentation

Our patient is following up in King Abdullah Medical City in Riyadh and the consent taken from the patient and from Endocrine Unit Research Committee. 35 years old Saudi male patient referred from primary health care center with uncontrolled HTN. In April 2014 the patient was diagnosed with

essential HTN and started on Prindopril and due to uncontrolled blood pressure (BP) his regimen was escalated till he continued with 5 antihypertensive drugs. The patient was investigated for the secondary causes of HTN. He was found to have elevated plasma aldosterone and suppressive rennin with hypokalemia and diagnosed with primary hyperaldosteronism.

Table (1): Initial investigations

Renin	<1.5 pg /ml
Aldosterone	31 ng/dl
Aldosterone / Renin ratio	>208
Sodium	141 mmol/L
Potassium	3.3 mmol/L
Chloride	107 mmol/L
Blood urea nitrogen	6.3 mmol/L
Creatinine	71umol/L
Bicarbonate	26 mmol/L

CT scan and MRI of adrenals were done and showed no definite lesion. The patient continued with his medication and regular follow up with endocrine clinic but still has episodes of uncontrolled HTN which needed admission in some occasions.

He is currently on:

- Spironolactone 25 mg BID.
- Prindopril 5 mg OD.
- Nifedipine 60 mg BID.
- Metoprolol 50 mg OD.
- Alpha methyl dopa 500 mg TID.
- In February 2018 of the diagnosis, the patient underwent CT adrenal again which showed

suspicious left adrenal nodule measuring 9 mm, which appear in coronal view with HU of fat likely adenoma (Fig. 1).

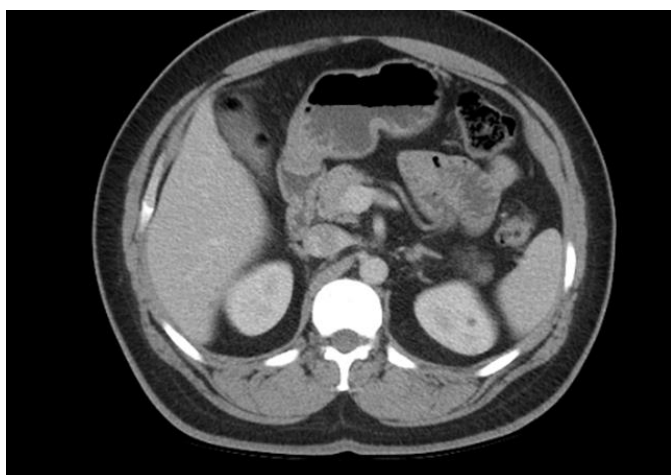


Figure (1): CT abdomen and pelvis

Table (2): Repeated lab investigation done with screening for pheochromocytoma

Aldosterone level	21 ng/dL
Renin	<1ng/dl
ALDOSTERON/RENIN RATIO	>208
PTH	20 ng/L
Sodium	139 mmol/L
Potassium	3.4 mmol/L
TSH	0.92 mU/L
Albumin	47g/L
Calcium	2.42 mmol/L
Vitamin D	55 ng/ml
Serum metanephrine	65 pg/ml
Serum normetanephrine	113 pg/ml

TSH: Thyroid stimulating hormone, PTH: Parathyroid hormone

Concurrently the patient was found to have elevated PTH with normal calcium and vitamin D level. The patient was referred to surgeon for left laparoscopic adrenalectomy. In March, 2018 the patient underwent left laparoscopic adrenalectomy. The pathology show adrenal adenoma negative for malignancy. The patient BP showed improvement after the surgery and only requiring low dose of Prindopril. Repeated PTH level was still elevated but decreasing with normal calcium and Vitamin D level. There was no parathyroid abnormality in Sestamibi.

DISCUSSION

In presence of high BP, low potassium and metabolic alkalosis, the primary aldosteronism should be suspected⁽⁶⁻⁸⁾.

Our case is a young patient who was diagnosed with hypertension secondary to hyperaldosteronism and concurrently the patient had hyperparathyroidism with normal vitamin D and calcium level. Several adrenal imaging failed to identify focal lesion at the

beginning but four years after the diagnoses the CT showed unilateral adrenal adenoma, which underwent laparoscopic adrenalectomy. The patient BP improved after the surgery.

The prevalence of PA is less than 1 percent of hypertensive patients, which suggested in older studies. However, other studies published over the past 15 years documented that the prevalence is significantly higher^(1, 4). Widespread measurement of the plasma aldosterone to renin ratio in a patients with hypertension resulted in marked increases in the annual detection rate of PA by 1.3- to 6.3-fold and in the number of hypertensive patients in whom PA was detected (Before screening 1 to 2 percent versus after screening 5 to 10 percent), which was noted in multicenter retrospective review^(1, 3 & 5).

The evaluation of a patient with possible PA begins with measurement of the PRA (plasma renin activity) or PRC (plasma renin concentration) and aldosterone concentration in a blood sample obtained at the morning in an ambulatory seated patient⁽⁶⁻⁸⁾. Renin is measured by either enzymatic activity or concentration⁽¹³⁾.

PA is suspected when PRA is suppressed to <1 ng/mL hour and PAC is ≥ 10 ng/dL. The PAC/PRA ratio is usually >20 ng/dL per ng/mL/hour. Most patients require confirmatory testing⁽⁶⁻⁸⁾.

The diagnosis of PA should be confirmed by detecting excess aldosterone secretion with one of several tests unless the patient has spontaneous hypokalemia, undetectable PRA or PRC, and a PAC ≥ 20 ng/dL; in this clinical setting, there is no but PA can explain these findings.^(6-8 & 13). To confirm PA, aldosterone suppression test is usually needed. It can be done with sodium chloride given orally and measurement of excreted aldosterone in the urine or by sodium chloride given intravenously and measurement of plasma aldosterone. When the diagnosis of PA has been established, a unilateral APA must be differentiated from bilateral hyperplasia^(14 & 15). In patients with PA, a challenging task is to differentiate between APA which is surgically curable and the bilateral adrenal hyperplasia (BAH) which is medically treatable. The differentiation usually require adrenal venous sampling however it is costly, invasive, with high risk and not available in all centers.

We found a relation between PTH elevation and APA, which usually corrected after adrenalectomy. These findings are similar to earlier observations, which indicated that the measurement of PTH may be helpful to distinguish between APA and BAH^(17, 18, 19 & 20).

In a study where 132 patients with hypertension referred to the Center of Excellence of the European Society of Hypertension prospectively recruited. Systematic screening for APA done for all patients, as reported^(16 & 21). The measurement of plasma renin activity, and aldosterone concentration in addition to serum sodium, potassium, phosphorus, calcium,

magnesium and vitamin D were included^(16 & 21). The twenty four hour urinary excretion rates of sodium, potassium, phosphorus, calcium, norepinephrine, epinephrine, normetanephrine and metanephrine were measured in the same day^(16 & 21). Forty six out of the fifty eight patients diagnosed with APA. Twelve PA patients with no lateralization in AVS were diagnosed with BAH. The secondary causes of hypertension were excluded in the rest of patients therefore, they were diagnosed with essential hypertension^(16 & 21). The high values (above the cutoff of 2.0) of the lateralization index at AVS proved the diagnosis of APA in all cases in addition to the BP outcome and the normalization of the ARR(Aldosterone renin ratio) after adrenalectomy^(16 & 21).

CONCLUSION

In patients with confirmed PA, routine assessment of serum parathyroid hormone may be helpful to identify those who are more likely to have APA, which is treated surgically before the adrenal venous sampling. Further investigations are needed to evaluate the mechanism of parathyroid hormone elevation in patient with APA and all patient with APA should be investigated for presence of hyperparathyroidism.

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