



34 year old Male with Hypertension

Colleen Flynn, MD

February 16, 2012

HPI

- 34 yo Male referred for HTN and hypokalemia
- Diagnosed with HTN 5 years ago
- History of hypokalemia that worsened with thiazide diuretic use
- Eats out for meals 50% of the week
- OSA but compliant with CPAP machine
- Minimal exercise
- Overweight since a teenager

Past Medical History

HTN x 5 years
Hyperlipidemia
OSA on CPAP

Medications

Clonidine 0.2mg BID
Prazosin 20mg AM, 10mg PM
Spironolactone 12.5mg daily
KCl 40 meq TID
Simvastatin 20mg daily

NKDA

Family History

F: HTN controlled,
dx in 50s
Sister: DM1

Social History

Married, one son
+Tob: 1ppd x 8 years
No EtOH or illicit drugs

Physical Exam

VS: **BP Sitting:** 158/84 with pulse 109 **BP Standing:** 150/83 with pulse 110. **Ht:** 6'1" **Wt:** 303 lbs **BMI:** 40

Gen: NAD

HEENT: PERRLA, anicteric sclera, no facial plethora

Neck: thyroid normal size/texture, obese, no dorsocervical fat pad

Chest: CTAB

CV: +S1/S2, tachycardia, no LE edema

Abd: obese, +BS, soft, nontender, nondistended, no hepatosplenomegaly

MSK: normal strength bilaterally upper and lower extremities

Skin: warm/dry, no striae

Neuro: no tremor, patellar reflexes 2+ bilaterally

ROS

- No HAs, no weight changes, no diaphoresis
- No vision changes
- No chest pain
- + palpitations at night associated with nausea and dizziness
- No shortness of breath
- No v/d/c, no abdominal pain
- +Nocturia

Outside hospital labs

139	103	16
3.3	22	1.0

98

eGFR: 87

HgbA1c: 6

AST: 20

ALT: 36

More Outside Hospital Labs

Plasma aldosterone: 28 ng/dL

Plasma renin activity: <0.6 ng/mL/h

Potassium: 4.0

24 hr urine aldosterone after salt
suppression: 34mcg (2-20)

24 hour urine creatinine: 1900
(600-2000)

Plasma normetanephrine: 0.33
(<0.9)

Plasma metanephrine: 0.25
(<0.5)

24 hour urine free cortisol: 20
(3.5-45)

24 hour urine creatinine: 1087
(600-2000)

TSH: 3.05

FT4: 1.24

Outside Hospital Imaging

MRI Abdomen w/wo contrast:

- ***0.9 x 0.9 cm*** enhancing nodule in the lateral limb of the **right** adrenal gland.
- **Left** adrenal gland is **normal**.
- Nonspecific T2 hyperintense lesion in the distal pancreatic body 1 x 0.7 cm.

OSH Adrenal vein sampling

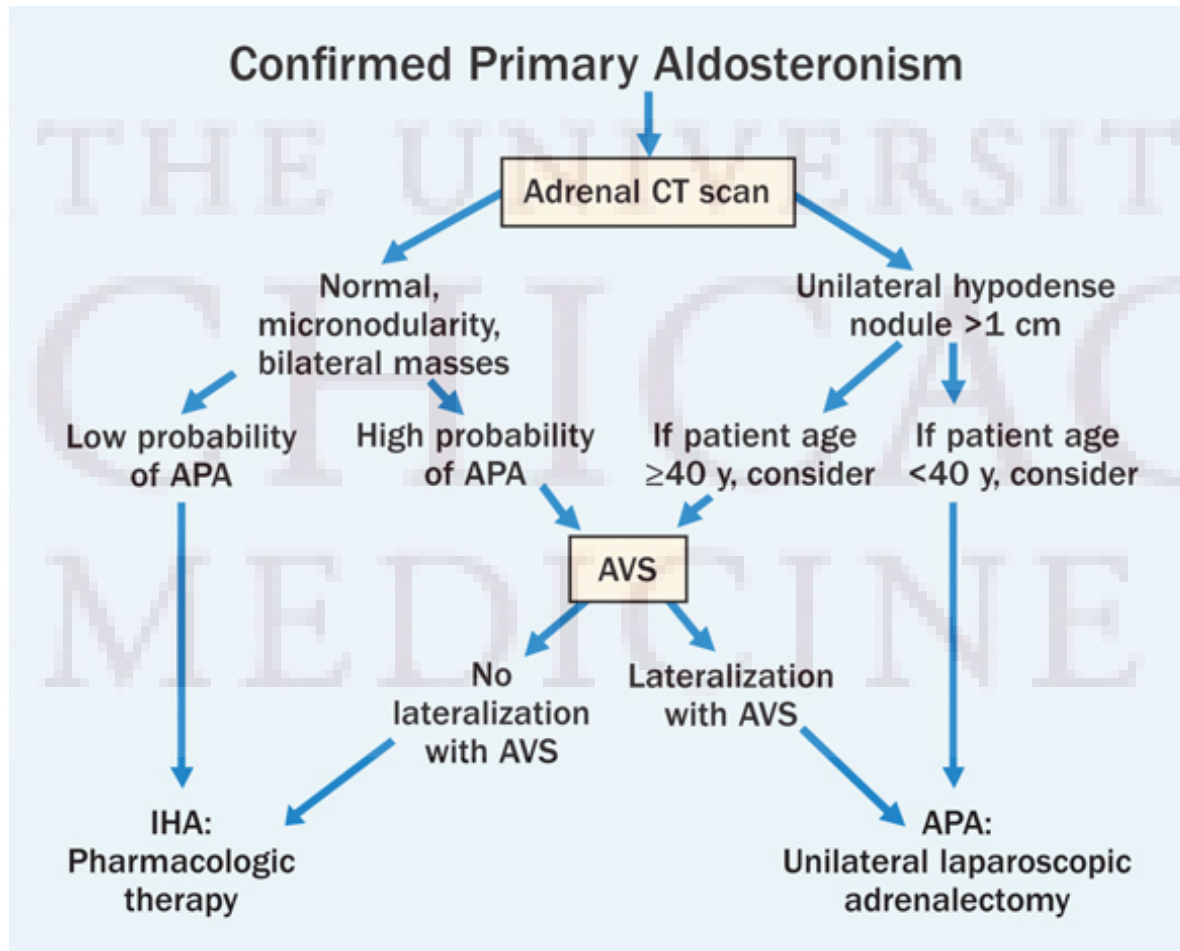
	Aldosterone	Cortisol	A/C Ratio
IVC	38	26.5	1.43
Right Adrenal vein	11	26.6	0.41
Left Adrenal vein	284	928.4	0.3

OSH Adrenal vein sampling

	Aldosterone	Cortisol	A/C Ratio
IVC	38	26.5	1.43
Right Adrenal vein	11	26.6	0.41
Left Adrenal vein	284	928.4	0.3

Interpretation: Inconclusive due to inability to cannulate right adrenal vein

Evaluation of primary hyperaldosteronism



Repeat Adrenal vein sampling at Mayo Clinic

	Aldosterone	Cortisol	A/C Ratio
IVC	65 ng/dL	21 ng/dL	3.1
Right Adrenal vein	110	660	0.17
Left Adrenal vein	67	482	0.14

Repeat Adrenal vein sampling at Mayo Clinic

	Aldosterone	Cortisol	A/C Ratio
IVC	65 ng/dL	21 ng/dL	3.1
Right Adrenal vein	110	660	0.17
Left Adrenal vein	67	482	0.14

Interpretation: $\frac{\text{Right A/C}}{\text{Left A/C}} = \frac{0.17}{0.14} = 1.2$

How to confirm a unilateral source of hyperaldosteronism?

- Study looked at 104 patients in which CT/MRI was equivocal for dx of aldosterone-producing adenoma.
- $(A/C_{\text{adrenal vein}})/(A/C_{\text{contralateral adrenal vein}}) \geq 2$
 - Using cutoff of ≥ 2 provided the best compromise of sensitivity and false positive rates.
 - 80% of patients correctly diagnosed (as confirmed by pathology and normal K/BP post adrenalectomy) if $C_{\text{adrenal vein}}/C_{\text{IVC}} \geq 1.1$ (accurate cannulization).

How to confirm a unilateral source of hyperaldosteronism?

- Retrospective study of 45 patients with primary aldosteronism with a **unilateral adrenal nodule on CT**
 - AVS done on all subjects
 - $(A/C_{\text{adrenal vein}})/(A/C_{\text{contralateral adrenal vein}}) \geq 2$ *and*
 - $C_{\text{adrenal vein}}/C_{\text{IVC}} \geq 1.1$
- **Nodule size < 10mm (n=10)**
 - 70% APA, 30% BAH by AVS
- **Nodule size > 10mm (n=35)**
 - 63% APA, 37% BAH

Ectopic Hyperaldosteronism

- Case reports of ectopic aldosterone sources
 - Adrenal adenoma posterior to stomach – surgical cure (*Arnold J. Postgraduate Medical Journal. 1989*).
 - Right kidney APA (*Abdelhamid S, et al. Arch Intern Med. 1996*).
 - Malignant ovarian tumor (*Jackson B. Aust NZ J Med. 1986*)

Take Home Points

- The correct interpretation of adrenal vein sampling is important to appropriately treat patients with hyperaldosteronism.
- There are rare case reports of ectopic sources of hyperaldosteronism.