49 year old Man with Cardiomyopathy and an Adrenal Mass

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UNIVERSITY OF CHICAGO

ENDORAMA

Disclosures

- I do not have any relevant financial relationships with any commercial interests.

Chief Complaint:

- **49 year-old** male with history of **CAD s/p PCI, peripheral artery disease, hypertension, and COPD** was transferred from an outside hospital in **12/2015** for evaluation of **advanced heart failure.**

Heart Failure History

January 2015

Dyspnea on exertion, LE edema
EF = 40-50%
Started CHF regimen

December 2015

Increased fatigue, edema, SOB
EF = 20%
Started CHF regimen

Rest of Past Medical History

Past Medical History

- Coronary artery disease
  - s/p RCA stent in 2011
- Peripheral vascular disease
  - s/p L leg stent
- COPD
- HTN (unknown duration)
- "Thyroid problem"
- No history of DM

No surgeries

Social History:

- Single
- Father of 3, grandchild x 1
- Works in construction
- Smokes ½ ppd
- Social EtOH use, no drugs

Family History: Father w/ CAD (MI 71 yo). No tumors/cancers in family.

Evaluation at time of CHF diagnosis (1/2015)

- Heart catheterization (1/2015): **20-50% plaque/stenosis through coronary arteries**; L main normal.

- CTA Chest (1/2015): "Interstitial coarsening with patchy bilateral ground-glass infiltrates in the posterior lobes. **Right adrenal mass measuring 4.8 x 4.1 x 4.2 cm."**

Review of Systems

- General: +fatigue, normal appetite. No fever. "eat a lot but still can't gain weight," +40 lb weight loss over last year.
- HENT: +congestion, no sore throat or changes in vision.
- Resp: +cough, PND, orthopnea, SOB, LE edema.
- Cardiac: +occasional episodes of very elevated BP. + palpitations. No CP.
- GI: No abdominal pain, nausea, vomiting, diarrhea, or hematochezia. +constipation.
- GU: No polyuria.
- Skin: No rashes. +intermittent pallor and diaphoresis x 2-3 months.
- Neuro: No weakness or numbness. +intermittent HA.
- Heme: No easy bruising.
- Psych: +occasional anxiety.

Inpatient Medications

- ASA 81 mg daily
- Atorvastatin 80 mg daily
- Carvedilol 3.125 mg BID
- Heparin 5000 units subq q8h
- Multivitamin
- Magnesium hydroxide 30 mL QID PRN
- Prochlorperazide 10 mg q6h PRN
- Senna-Docusate
- At OSH:
  - Isosorbide dinitrate 20 mg TID
  - Hydralazine 20 mg TID
  - Furosemide 40 mg IV BID

Physical Exam

- Vitals: T 97.5F, P 94, BP 135/107, O2 93% on room air. Ht 5'9'', Wt 54.4 kg, BMI 17.7
- General: Thin-appearing, no acute distress.
- HEENT: +temporal wasting, conjunctiva normal, EOMI, PERRL
- Neck: +elevated JVD, no thyromegaly, no cervical lymphadenopathy
- CV: RRR, no murmurs or extra heart sounds, radial pulse 2+
- Pulm: +bibasilar crackles
- Abdomen: soft, non-tender, ND.
- MSK: No LE edema
- Neuro: A&O x 3
- Skin: warm, dry
- Psych: mood normal

Initial Laboratory Evaluation

- **BMP**:
  - Na 134
  - K 4.5
  - Cl 99
  - bicarb 21
  - BUN 41
  - Cr 1.4
  - glucose 147
  - Ca 8.8, Phos 1.8
- **Liver Panel:**
  - total protein 6.8
  - albumin 3.8
  - total bilirubin 2.1
  - indirect bili 1.8
  - AlkP 157
  - AST 705, ALT 1548
- **CBC:** WBC 17.8, Hgb 15.5, plt 308
  - 84% PMN, 9% Lymph
- Other:
  - BNP 3421
  - Troponin < 0.03
  - Resp panel: negative
  - UA: negative
  - CRP 15

Further Evaluation (12/2015)

- CXR: Mild pulmonary interstitial pulmonary edema, mild cardiomegaly.
- Renal ultrasound: "Heterogeneously hyperechoic mass which appears to be superior to the right kidney; appears to have a relatively well-circumscribed hypoechoic capsule. **Measures 4.8 x 5.2 x 5.4 cm**."
- CT Chest: No PE. No mention of abdominal imaging.
- R heart catheterization: normal filling pressures; low cardiac output
- TSH 1.60 mcU/mL
- ANA 160 (ref range 0-80)

DDx of Adrenal Incidentaloma

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Functional (10-15%)

- **Adenoma: hypercortisolism (6-15%)**
- Adenoma: hyperaldosteronism (1-2%)
- Pheochromocytoma* (3-7%)
- Carcinoma (any adrenal hormone)
- Bilateral macronodular adrenal hyperplasia*

Non-functional (85-90%)

- **Adenoma* (60-90%)**
- Myelolipoma (6%)
- Neuroblastoma
- Hemangioma
- Ganglioneuroma
- Carcinoma (2-5%)
- Metastasis* (0.7-9%)
- Other: infection*, CAH*, cyst, hemorrhage*, granuloma*, amyloidosis

* May be bilateral adrenal masses

DDx of Unilateral Adrenal Incidentaloma

Hormonal Excess

- Adenoma: hypercortisolism
- Adenoma: hyperaldosteronism
- **Pheochromocytoma**
- **Adrenocortical carcinoma (any adrenal hormone)**
- Bilateral macronodular adrenal hyperplasia

No hormonal excess

- **Adenoma**
- Myelolipoma
- Neuroblastoma
- Hemangioma
- Ganglioneuroma
- **Adrenocortical Carcinoma**
- Metastasis Other: cyst, hemorrhage, granuloma

Initial Work-Up?

Initial Work-Up?

- Imaging:
  - CT Abdomen w/wo IV contrast and wash-out of contrast
  - MRI Abdomen w/wo IV contrast and wash-out of contrast

- Evaluation of hormonal excess
  - Cortisol/ACTH and/or 1 mg dexamethasone suppression test
  - Plasma free metanephrines OR 24-hr Urinary catecholamines, fractionated metanephrines
  - Plasma Aldosterone, renin

Interference with measuring catecholamines and metabolites

- CKD
- Meds interfere with HPLB-ECD Assays:
  - Acetaminophen
  - Labetalol
  - Buspirone
  - Masalamine, Sulfasalazine
- Meds increase catecholamines:
  - Ephedrine, Amphetamine, cocaine, caffeine, nicotine
  - SNRI (venlafaxine), SSRI, TCA
  - Dihydropyridine CCB
  - Beta-blockers
  - Selective alpha-1 blockers
  - Non-selective alpha blockers

Medication Interference: Our Patient

- ASA 81 mg daily
- Atorvastatin 80 mg daily
- Carvedilol 3.125 mg BID
- Heparin 5000 units subq q8h
- Multivitamin
- Magnesium hydroxide 30 mL QID PRN
- Prochlorperazide 10 mg q6h PRN
- Senna-Docusate
- At OSH/UCMC:
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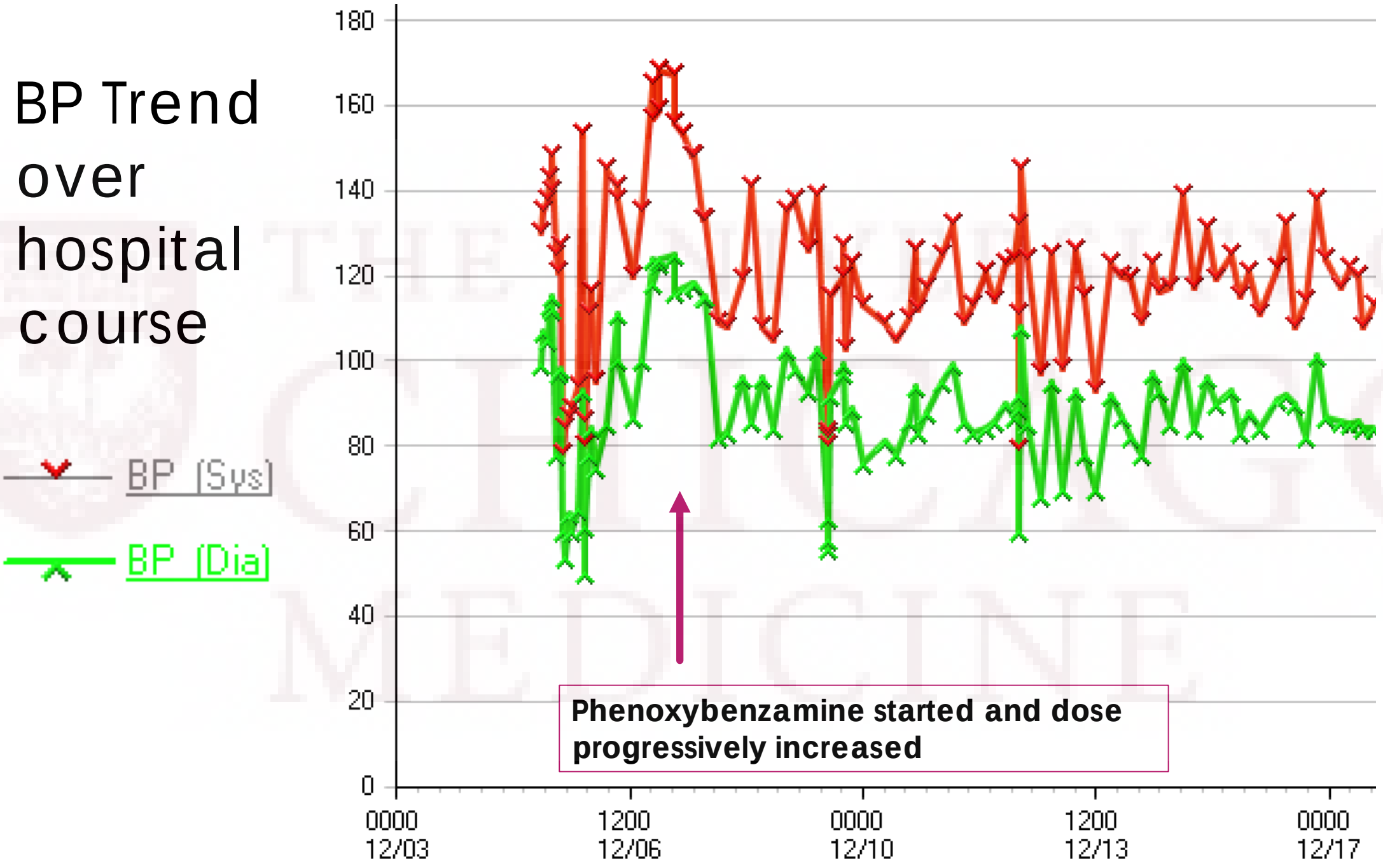
Treatment?

Treatment

- Recommend starting Phenoxybenzamine 10 mg daily
- Discontinue beta-blocker ?

BP Trend over hospital course



Laboratory Results

- s/p 1 mg Dexamethasone suppression test:
  - ACTH 2.8 pg/mL
  - Cortisol 6.1 ug/dL

- *Pending:*
  - *Renin, aldosterone sent*
  - *Plasma metanephrines*
  - *Urine 24-h catecholamines/metanephrines*

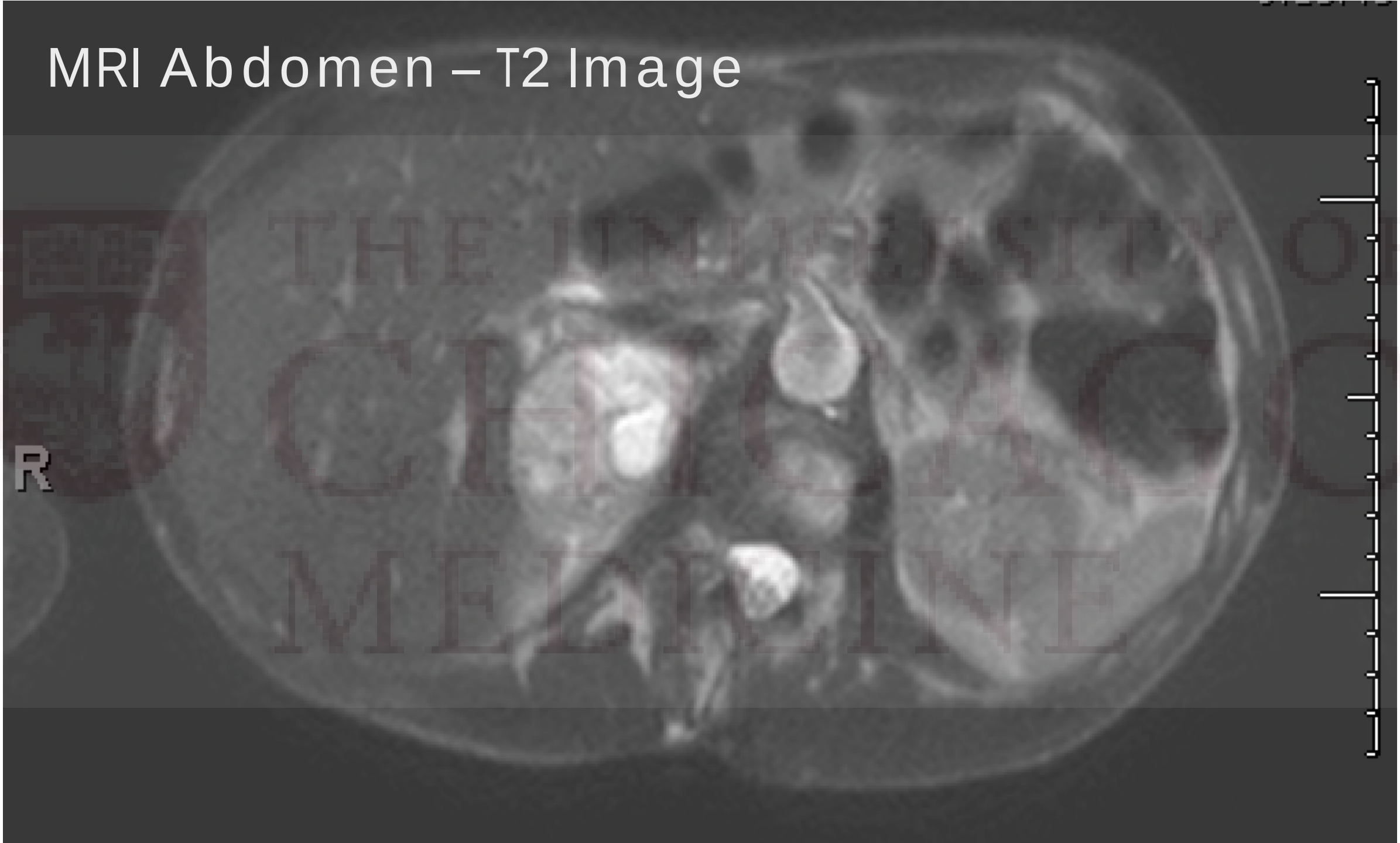
Imaging

Imaging phenotypes

	Adrenocortical Carcinoma	Metastasis	Pheo-chromocytoma	Adenoma
Unenhanced Attenuation (HU); *CT-only*	36.9 ± 4.1	39.2 ± 15.2	38.6 ± 8.2	16.2 ± 13.6
Size	Most > 4 cm (90%)	Variable	Variable	Most < 4 cm
Borders	Irregular	Irregular		Smooth
Appearance	Inhomogeneous, calcifications	Inhomogeneous	Cystic, hemorrhagic	Homogenous
T1/T2 *(MRI-only)*	Hypointense on T1; High signal on T2	Isointense on T1; High signal on T2	High signal on T2	T1 & T2 isointense w/ liver
Wash-Out	Delayed	Delayed	Delayed	Rapid
Laterality	Unilateral	Bilateral	Uni/Bilateral	Unilateral
Other	Local invasion or metastases			

Hamrahian et al. JCEM. 2005; UpToDate.com

MRI Abdomen – T2 Image



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Laboratory Studies

- Plasma:
  - Metanephrine 2.2 (Ref range < 0.5 nmol/L)
  - **Normetanephrine 58 (Ref range < 0.9 nmol/L)**
- 24-hr Urine:
  - Epinephrine 45 (Ref range < 21 mcg)
  - Dopamine 104 (Ref range 65-400 mcg)
  - **Norepinephrine 2047 (Ref Range 150-80 mcg)**

Catecholamine-Associated Cardiomyopathy

- Pathogenesis:
  - Stimulation alpha-1 receptors -> coronary vasospasm
  - Stimulation beta-1 receptors -> hyperdynamic basal contraction
- Echo Features:
  - Severe left ventricular dysfunction
  - Dilated or hypertrophic cardiomyopathy
  - ± Wall motion abnormalities consistent with Takotsubo

Yoshikawa, T. Int J Cardiology. 2015.
Batisse-Lignier et al. Medicine. 2015.
Giavarini et al. Heart. 2013

Pheochromocytoma/paraganglioma (PPGL) and Cardiomyopathy

- Acute catecholamine cardiomyopathy (ACC) occurs in ~ 8-11 % of patients with PPGL

- Risk factors:
  - *No clinical, biological, tumor, or genetic characteristics associated with ACC*
  - Typical catecholamine triggers in pheo can precipitate ACC

Giavarini et al. Heart. 2013.
Zelinka et al. Horm Metab Res. 2012.

Outcomes in Catecholamine-Induced Cardiomyopathy

- Progressive alpha-blockade and subsequent beta-blockage can restore LVEF to normal levels before surgery (Fig. 3).

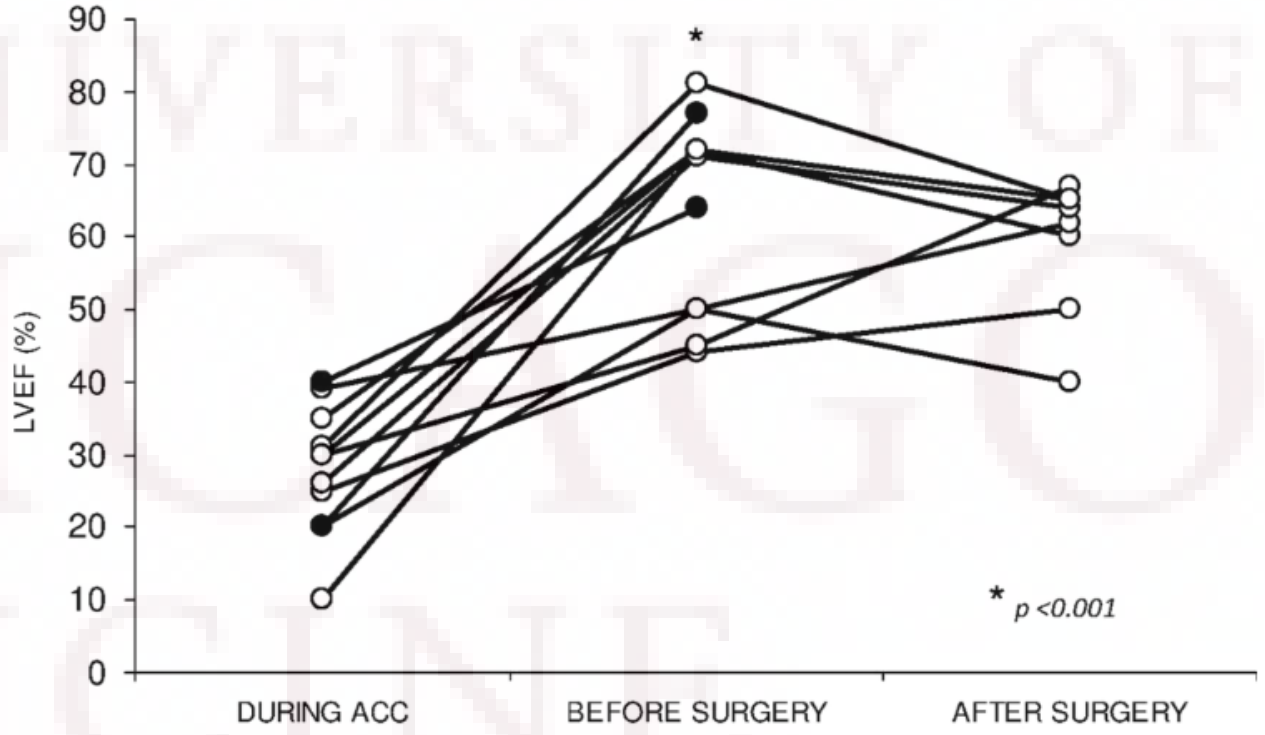

Figure 3 Left ventricular ejection fraction (LVEF) during acute catecholamine cardiomyopathy (ACC), before surgery and at follow-up. Nine patients had echographic LVEF assessments at the three time points (open circles). Two patients had echocardiographic LVEF assessments during ACC and before surgery (closed circles). *Difference between LVEF during ACC and after recovery, before surgery.

Giavarini et al. Heart. 2013.

Back to our patient...

Works Cited

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