



Conn's Syndrome

Objectives

- » understand pathophysiology of hyperaldosteronism
- » understand the work up of primary hyperaldosteronism (PA)
- » appreciate the role of AVS in the workup for PA
- » demonstrate the role of surgical intervention in the treatment of Conn's

Objectives

- » understand pathophysiology of hyperaldosteronism
- » understand the work up of primary hyperaldosteronism (PA)
- » appreciate the role of AVS in the workup for PA
- » demonstrate the role of surgery in the treatment of Conn's

Adrenal Surgery for Conn's

- » recalled 24 adrenalectomy patients
 - » median Follow-up 42 months
- » estimated cost of BP meds vs. surgery (+meds) over life expectancy
- » estimated cost savings for adrenalectomy / patient = \$31,132

Sywak & Pasieka Br J Surg:89;2002

Factors that Influence Cure

- » **young age**
- » **short history of hypertension**
- » **mono therapy**
- » **spironolactone control**

Lo CY Ann Surg 224(2):1996

Surgical Outcome from Adrenalectomy

- » 90 - 100% resolution of hypoK⁺
- » 90 - 95% improvement in BP control
- » 30 - 50% Cure (off all meds)
- » 60 - 65% decrease in meds
- » 5% no change

Controlled	Meds	K+	>20mmHg	Cured
36 (95%)	29 (76%)	33 (87%)	31(82%)	11 (29%)



Median 16 months (1 - 84)

Harvey et al Surg;140;2006

- » cure (BP < 140/90 off all meds)
 - » 32 - 50 %
- » reduction of BP medications
 - » 87 - 100%

Rutherford et al WJS: 20;1996

Sawka et al Ann Intern Med:135;2001

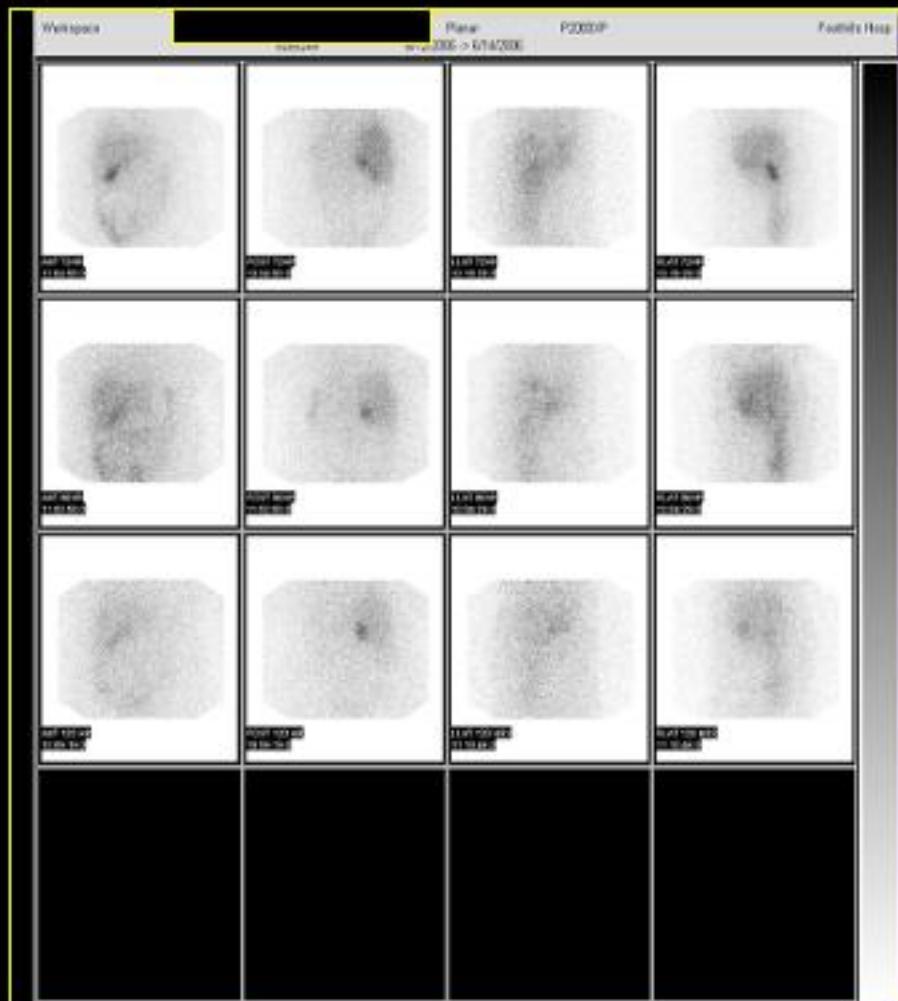
Surgical Pathology

	APA	PAH	BAH
UofC	36 86%	3 7%	3 7%
Hong Kong	32 68%	15 32%	
Mayo	102 89%	8 7%	4 3%

Endoscopic Adrenalectomy Treatment of Choice



NP-59 Dex suppression Scan



	<i>Cortisol</i>	<i>Aldo</i>	<i>Aldo:Cortisol</i>
IVC	301	1,410	4.68
Rt	658	75,446	114.0
Lt	515	1,117	2.17
IVC-ACTH	461	4,424	9.60
Rt-ACTH	28,859	603,900	20.93
Lt-ACTH	17,980	13,494	0.75

Criteria for Lateralization

- » Placement of catheter
 - » Cortisol Adrenal Vein : Cortisol IVC
 - » 3:1 or 5:1 stimulated
- » Lateralization
 - » Aldosterone affected:unaffected 10:1
 - » Aldo:Cortisol affected:unaffected 4:1
 - » Stim Aldo:Cortisol IVC > unaffected

Surgical Intervention

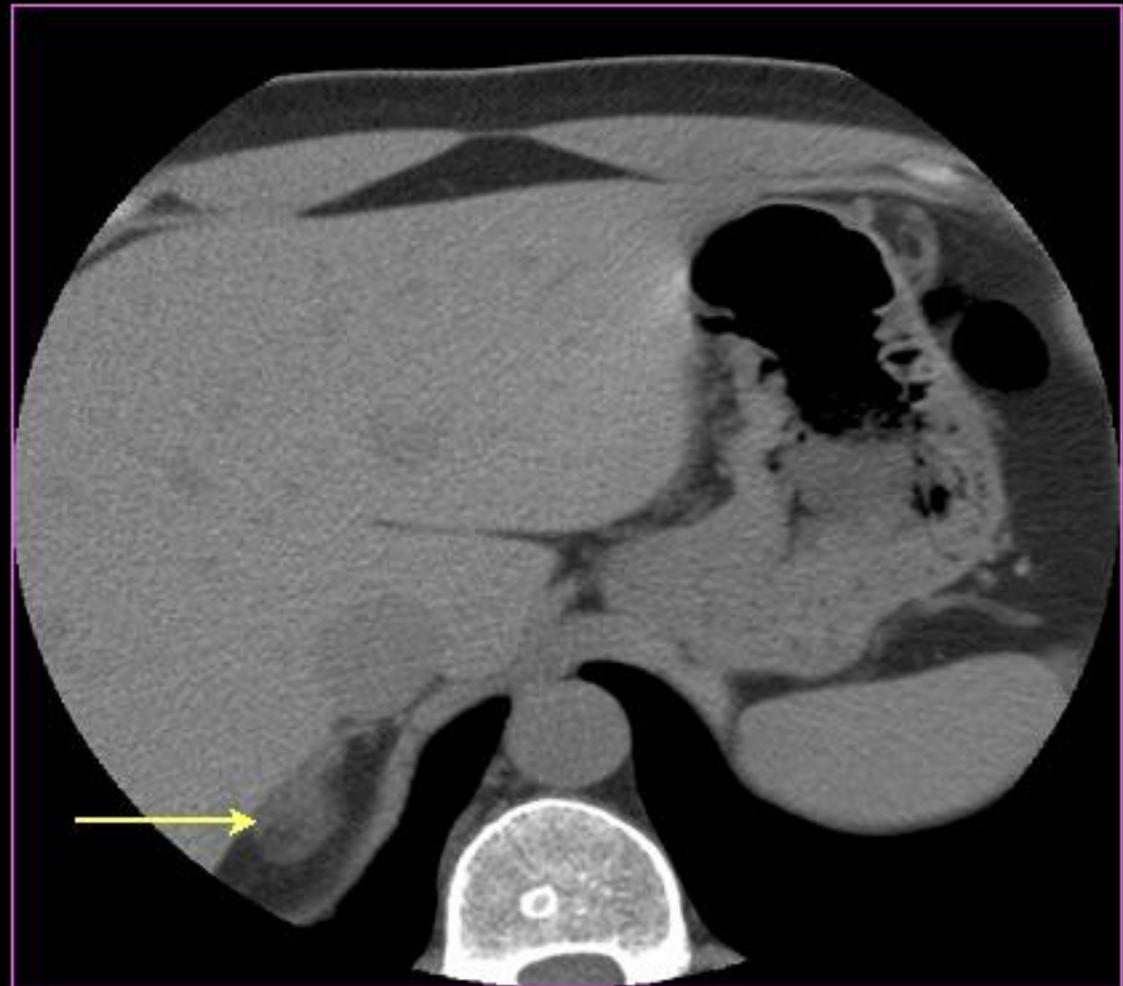
- » *CT \geq 1 cm nodule & < 40 yrs - OR*
- » *> 40 yrs*
- » *CT normal*
- » *CT bilateral masses*
- » *203 patients*
- » *anatomical imaging only*
 - » **22% excluded from adrenalectomy**
 - » **25% potentially unnecessary surgery**



AVS



**Localize and
Lateralize**



Screening of Hypertensive Patients

- » **selective screening (hypoK⁺)**
 - » prevalence hyperaldosteronism 0.5-2%
 - » adenoma 68 - 86%
- » **non-selective screening (Aldo:Renin)**
 - » prevalence hyperaldosteronism - 15%
 - » adenoma 28 - 50%

- » 5 to 15 fold increase PA
- » only 9 - 37% were hypoK⁺
- » detection of adenoma increased 1.3- 6.3 times
- » higher proportion of adenomas in AVS centers (28 - 50%) vs 9%

	Aldo:Renin pmol/L.ng.L/sec	Aldo pmol/L
Italy	4000	416
Mayo	2000	416
Singapore		
Australia	3000	
Chile	2500	

Mulatero JCEM 89;2004

Screening for Hyperaldosteronism

- » 15 prospective trials Aldo:Renin
- » Weinberger *Arch Int Med* 153;1993
 - » Aldo:Renin > 30
 - » Aldosterone > 20 ng/dL
 - » Sensitivity and Specificity - 90%
- » Young *Endocrinology* 144;2003
 - » Aldo:Renin > 555 pmol/L per ng/ml/hr
 - » Aldosterone > 416 pmol/L
 - » 90% confirmed surgically correctable

Diagnosis

- » **hypertension and hypok⁺**
 - » **aldosterone**
 - » **renin**
 - » **18-OH-corticosterone**
 - » **urinary Aldosterone**
 - » **saline suppression test***
- Aldo : Renin

Prevalence of 1^o Aldosteronism

0.05 - 2% of hypertensives

- » 12% Australia
- » 14 - 16% in UK
- » 18% Singapore
- » 32% South Africa



Gordon *et al* Clin Exp Phar:20;1993
Lim *et al* Lancet:353;2000
Loh *et al* Clin Endo Metabol:85;2000
Rayner *et al* S A Med J:90;2000



Adrenal

» 'hyperaldosteronism exist many years before hypokalemia... the possibility that 20% of essential hypertensive may be cured by surgical resection of an aldosterone-producing tumor'



Jerome W. Conn

Conn JAMA;190:1964

Hyperaldosteronism

- » adenoma
- » bilateral hyperplasia (IHA)
- » primary adrenal hyperplasia (PAH)
- » adrenal carcinoma

- » Glucocorticoid-remediable
- » licorice
- » renal artery stenosis

Diagnosis Hyperaldosteronism

- » resistant hypertension
- » hypokalemia (40%)
- » polyuria
- » muscle weakness

Adrenal

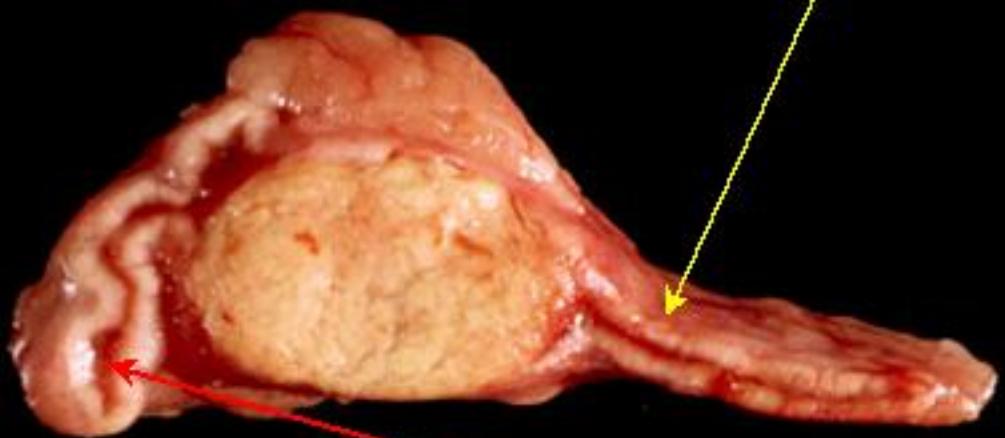
- » 1927 cortin
- » 1948 cortisone
- » 1952 aldosterone
- » 1954 Conn 1^o hyperaldosteronism
 - » 4 cm adrenal tumor
- » 1961 - 108 patients - 90% adenoma
 - » mean size > 4 cm



Conn Arch Intern Med:107:1961

Aldosterone

- » Aldosterone acts primarily in the distal nephron to increase the reabsorption of Na^+ and Cl^- and the secretion of K^+ and H^+
- » regulated by
 - » Volume renin - angiotensin system
 - » K^+
 - » ACTH



Cortex

Glomerulosa - salt
Aldosterone

Fasciculata - sugar
Cortisol

Reticularis - sex
Androgens

Medulla

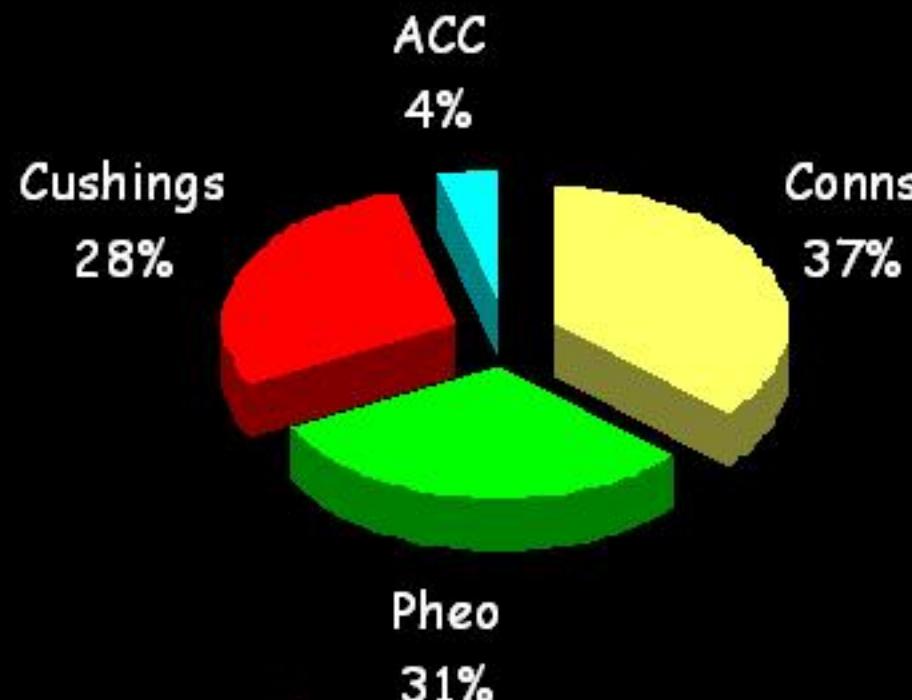
Epinephrine
Norepinephrine
Dopamine

Results



180 patients with 194 adrenal lesions

120 (67%) Functioning Lesions



Chavez J & Pasieka JL Am J Surg 189(5): 2005

