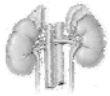
Adrenal Incidentaloma



Endocrine Surgical Oncology
October 27, 2007

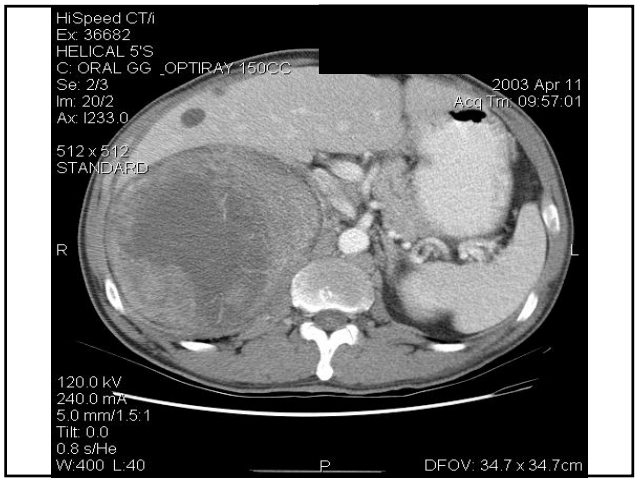
Dr. S. P. Bugis
St. Paul's Hospital

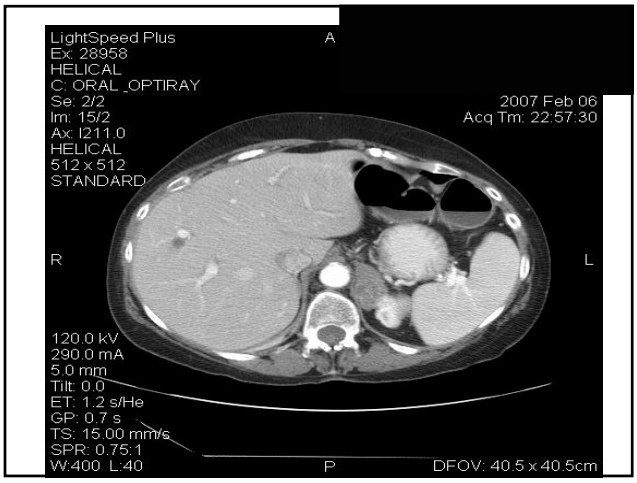
Department of Surgery
University of British Columbia

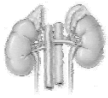
- Adrenal Incidentaloma

"Worry gives a small thing a big shadow"

Swedish proverb







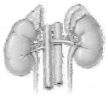
Adrenal Incidentaloma

What is the extent of the clinical problem?

What are the appropriate investigations?

Who needs surgery?

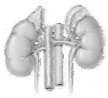
Who should do it?



Adrenal Incidentaloma

"There is no question, however, that apparently `functionless` adrenal cortical neoplasms do occur"

Arch Int Med, 1941
Kepler and Keating,



Adrenal Incidentaloma

1-4% of abdominal CT scans

Autopsy incidence of 2-5%

- 0.5% when < 30yrs
- 3.0% when > 50yrs
- 7.0% when > 70yrs

Adrenal Incidentaloma

What has been the impact on clinical practice?

- Linear increase in adrenalectomies since mid 1990's
- 3 fold and 8 fold increase in surgery for Conn's and phaeochromocytoma respectively

Sidhu et al. ANZ J Surg, 2002

Adrenal Incidentaloma

What has been the impact on clinical practice?

- Total number has doubled
- Rate has increased by 50%
  - Unchanged for malignancy
  - Doubled for benign lesions

Saunders et al. World J Surg, 2004

Adrenal Incidentaloma

Have the patients benefited?

- YES - increased recognition of surgically correctable causes of hypertension
- MAYBE - surgery for cancer in the last 10-12 years does predict improved survival (though stage of presentation has not changed)

Kebebew et al. World J Surg, 2006

Adrenal Incidentaloma

Have the patients benefited?

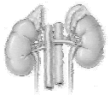
"We must be cautious not to alter the indications for operation …… solely because our technical and surgical skill allow safer operations…"

Saunders et al

Adrenal Incidentaloma

"The indication for surgery is not just being able to perform the operation"

Anonymous



Adrenal Incidentaloma

Is it functioning?

Is it malignant?

What is it?

Adrenal Incidentaloma

What is it?

82% non functioning adenomas
5% sub clinical Cushing syndrome
5% phaeochromocytomas
5% adrenocortical carcinomas
2.5% metastatic
1% aldosterone producing adenomas

Young WR Jr. Endocrinol Metab Clin NA, 2000
Shen WT, Sturgeon C, Duh QY. Journal of Surgical Oncology, 2006

Adrenal Incidentaloma

What is it?

- Cysts, myelolipomas,
- Primary tumors of retroperitoneum, stomach, pancreas

Adrenal Incidentaloma

In a patient with a known primary malignancy elsewhere:

- 25-72% chance of an adrenal mass being a metastasis
- Often small and bilateral
- Will have same imaging characteristics as primary cancer of the adrenal
- Lung, melanoma, renal cell, colon, breast

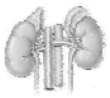
Choyke PL. J Am Coll Radiol, 2006
ShenWT, Sturgeon C, Duh QY. Journal of Surgical Oncology, 2006

Adrenal Incidentaloma

Subclinical Cushing's Disease

- autonomous cortisol secretion
- lack typical signs and symptoms
- may have insulin resistance, hypertension, osteoporosis, obesity
- some risk of developing overt Cushing syndrome

Investigation of the Adrenal Incidentaloma



History and physical

Laboratory investigations

Imaging

Investigation of the Adrenal Incidentaloma

History and Physical

- Past history of malignancy or endocrine disease
- Clinical evidence of Hypertension, Cushing's disease, malignancy

Investigation of the Adrenal Incidentaloma

Laboratory

Phaeochromocytoma

- Plasma metanephrines or
- 24 hr urine metanephrines, VMA, catecholamines

Cushing's

- Overnight dexamethasone suppression test
- 24 hr urine coritsol

Investigation of the Adrenal Incidentaloma

Aldosterone producing adenoma

- Plasma aldosterone to renin ratio
- >25 indicates Conn's

Virilizing and feminizing adrenal tumors

- DHEA
- Androstenedione
- Testosterone, estrogens

Imaging for the Adrenal Incidentaloma

Imaging for the Adrenal Incidentaloma

CT Scan

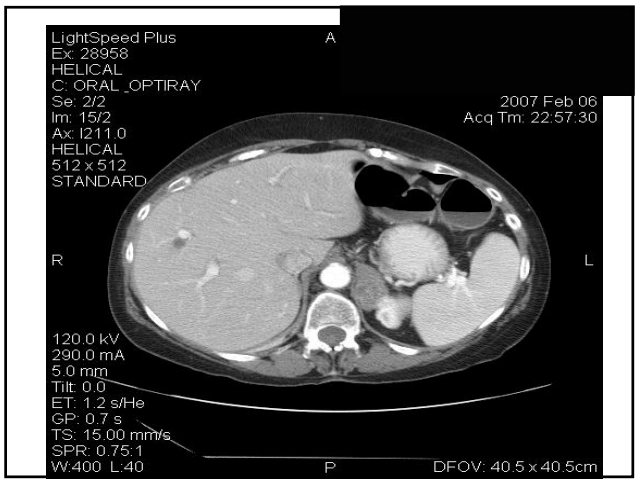
- Size
- Appearance
- Attenuation

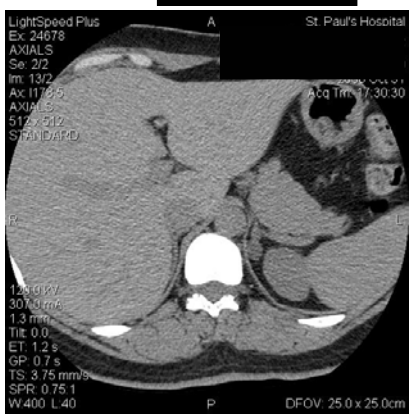
Imaging for the Adrenal Incidentaloma

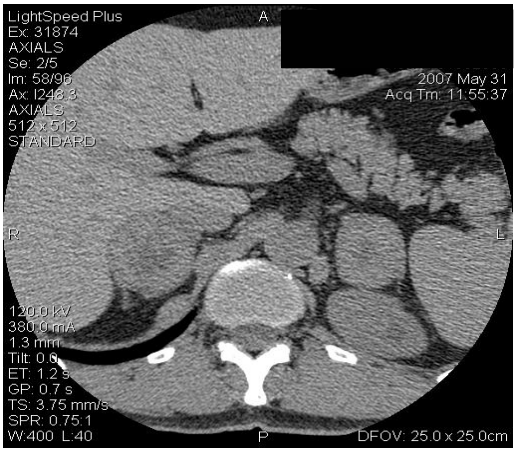
CT Scan

Attenuation

- < 10 Hounsfield units unenhanced --> benign
- > 60% washout on enhanced CT --> benign



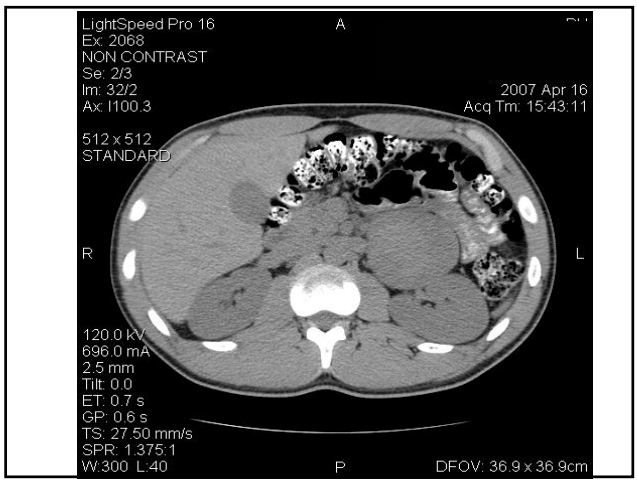


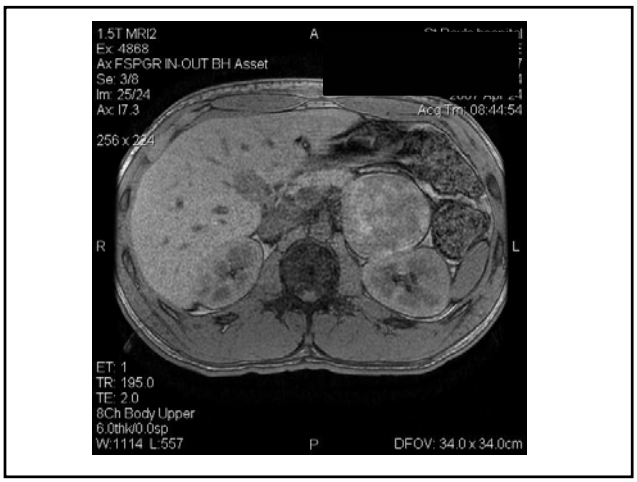


Imaging for the Adrenal Incidentaloma

Magnetic Resonance Imaging

- Avid enhancement
- Delayed washout
- Brighter T2 weighted images
  - All suggest malignancy
  - Overlap with benign lesions is significant
- Chemical shift MRI may help
  - Loss of signal intensity from in phase to out of phase images suggest lipid rich adenoma





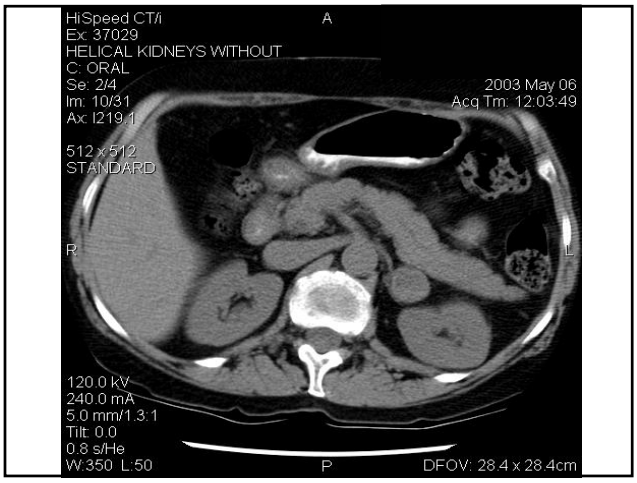
Imaging for the Adrenal Incidentaloma

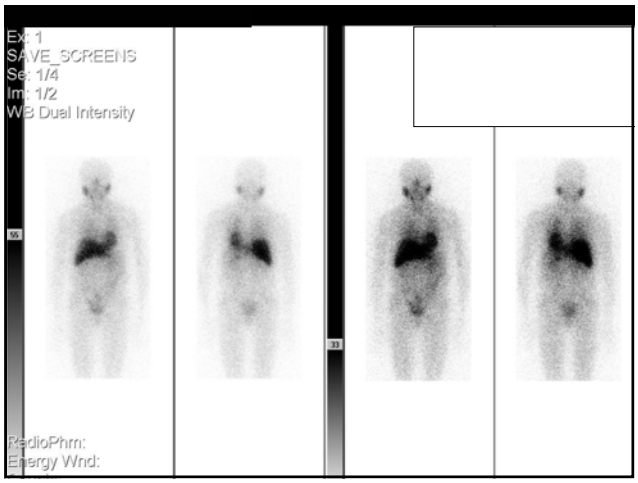
Other Modalities

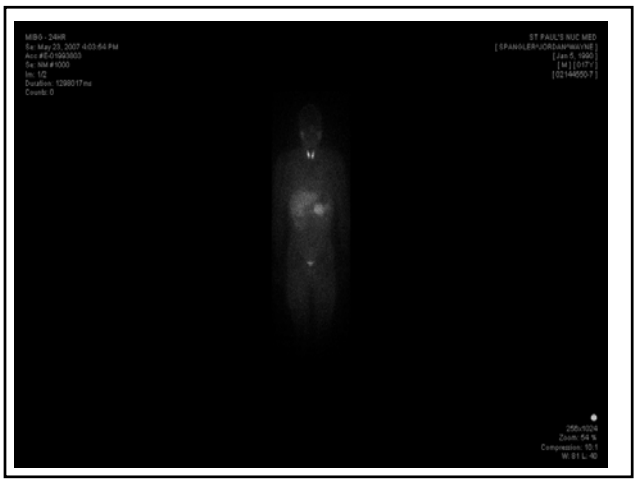
- PET Scan
- Iodocholesterol Scan
- MIBG Scan
- Octreotide Scan

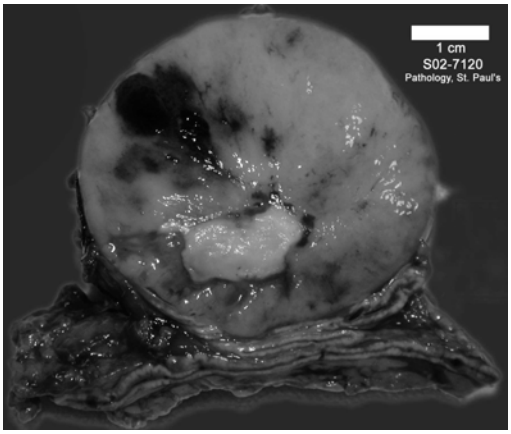
Choyke PL. J Am Coll Radiol, 2006

Al-Hawary MM. Best Practice and Research, Clinical Endocrinology and Metabolism, 2005









Adrenal Incidentaloma

Size does matter

Or does it?

Adrenal Incidentaloma

- 92% of adrenal cortical carcinomas are >6 cm
- 25% of adrenal masses >6 cm are cancers
- 6% of adrenal masses 4-6 cms are cancers
- 2% of adrenal masses <4 cm are cancers

Adrenal Incidentaloma

- History of other malignancy influences the association of size and malignancy
- 3 and 4 cm lesions can rarely be malignant
- Other factors need to be considered
  - Imaging characteristics
  - Patient age
  - Co-morbidities
  - Secretion of multiple hormones increases cancer risk

Grumbach MM et al. Ann Intern Med, 2003

ShenWT, Sturgeon C, Duh QY. Journal of Surgical Oncology, 2006

Investigation of the Adrenal Incidentaloma

What is the role of Fine Needle biopsy?

- Probably no role for routine use
- Always rule out function beforehand
- May have limited role for patient with known primary malignancy and undiagnosed adrenal mass

Sturgeon C, Kebebew E. SCNA, 2004

Adrenal Incidentaloma

Who deserves an operation?

A functioning tumor

Suspicion of malignancy

- Size - > 5 cm in anyone
  - > 3 or 4 cm in selected patients
- Suspicious imaging characteristics

Adrenal Incidentaloma

Surgical Approach

Laparoscopic is procedure of choice in most situations

Size will have an influence

Preoperative or intraoperative suspicion for malignancy does not preclude laparoscopic removal but the threshold for opening should be low

Adrenal Incidentaloma

"Although limited experience exists with large and malignant tumors, it appears the technical abilities of the operator …. are the limiting factors"

Gumbs AA, Gagner M. Best Practice and Research Clin Endocrinology and Metabolism, 2006

Adrenal Incidentaloma

Follow Up

- Proper investigations and interval remain unproven
- Studies are small, variable length of follow up
- Larger and suspicious masses have generally been surgically removed

Adrenal Incidentaloma

Follow Up

- 5-25% will increase in size
- Up to 20% will develop hormone overproduction
- Risk of malignancy probably rare

Adrenal Incidentaloma

Follow Up

- CT imaging at 3-6 months, 12-18 months and possibly 27-30 months
- Biochemical testing for 3-5 years

Grumbach MM et al. Ann Intern Med, 2003
Bulow B et al. European Journal of Endocrinology, 2006

Adrenal Incidentaloma

New Directions

More accurate imaging
Robotics in adrenal surgery
MIS surgery and malignancy
Role of partial adrenalectomy

Adrenal Incidentaloma

Summary

- Not a rare clinical problem
- Proper investigation and follow up are crucial
- Surgery – an appropriate approach by a suitable team

Adrenal Surgery

Who's domain is it?

Operative time, blood loss, length of stay are not influenced by high or low volume centers

Kwan et al. Am J Surg 2007

Adrenal Surgery

Who's domain is it?

"Although limited experience exists with large and malignant tumors, it appears the technical abilities of the operator …. are the limiting factors"

Gumbs AA, Gagner M. Best Practice and Research Clin Endocrinology and Metabolism, 2006