Adrenal Incidentalomas in the real world

Objectives

• 1. Define “adrenal incidentaloma”
• 2. Review the differential diagnosis of incidental adrenal lesions and the most common lesions
• 3. Provide a practical approach to using imaging studies to determine the most likely etiology of incidental adrenal lesions

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Preface - Adrenal Facts…

- **Definition of an adrenal incidentaloma**
  - Adrenal mass, typically $> 1$ cm
  - Discovered by imaging performed for indication other than assessing for adrenal disease
    - *Should exclude staging evaluation of patients with cancer*
- **Prevalence of unsuspected adrenal masses increases with age**
  - Prevalence 0.2% - 10% as age increases 20’s to 70+ yrs
  - Higher on autopsy studies, but typically includes all sizes
Etiologies of adrenalomas
(i.e. should we be worried?)

- **Differential diagnosis of adrenal incidentalomas**
  - Non-hypersecreting benign cortical adenomas (majority)
  - Hypersecreting adenomas
    - Cortisol secreting adenomas, aldosteronomas, pheos
  - Metastatic disease
  - Adrenal cortical carcinoma
  - Myelolipoma
  - Cysts
  - Hemorrhage
Adrenal adenomas

- 1-10% at autopsy, equal incidence in both genders
- Most are less than 2 cm
- Estimated 15% are functional (excess glucocorticoids, mineralocorticoids)
  - Clinical / sub-clinical Cushing’s, Conn’s syndrome, Pheo
- Lipid in adrenal adenomas are precursors to adrenal cortical hormones
  - Lipid-rich adrenal cortical adenomas are detected by identifying intracytoplasmic lipid content (70%)
  - Lipid-poor adrenal cortical adenomas do not have enough lipid content to be detected on imaging (30%) and are characterized by rapid washout compared with metastases
Adrenal Carcinoma

- Rare - 4-12 cases / million
- Prevalence increases with size …
  - \(\leq 4\) cm - 2%
  - 4.1 - 6 cm - 6%
  - > 6 cm - 25%
- Poor prognosis - median survival 18 months
- Therefore - even though 75% of adrenal masses > 6 cm and > 90% of lesions 4 - 6 cm are not adrenal CA, Urologists and general surgeons are overly cautious
- Most adrenal mass lesions > 4 cm that cannot be confirmed as benign are resected

- So … #1: size is an important determinant of managing adrenal incidentalomas
Metastatic disease

- Cancers likely to metastasize to the adrenal glands
  - Either common cancers, or common to adrenal
    - Lung CA
    - Breast CA
    - Lymphoma
    - Renal cell carcinoma
    - GI tract: Esophageal, Gastric and
  
- CA hx: estimated 75% of adrenal masses are metastases
- No CA hx: metastases are extremely rare
  - 0 of 973 consecutive incidental adrenal masses (Song J, AJR 2008)
  - 1.5% of 342 patients, all lesions > 5 cm (Herrera MF, Surgery 1991)

- So ... #2: history of a malignancy is an important determinant of managing adrenal incidentalomas
Grossly fatty mass = Myelipoma

- Benign tumor-like lesion composed of mature adipose tissue and haematopoietic elements in *various proportions*
- Asymptomatic and are not hormonally active
- Unusually not treated (if very large may be resected for bleeding risk)
CT and MR imaging of adrenalomas

- CT - unenhanced and washout (as needed)
  - Lipid-rich adenomas - Unenhanced CT
    - < 10 HU ~ meta-analysis sens 71%, spec 98% for adenoma
      (Boland)
  - Lipid-rich and lipid poor adenomas: Washout CT
    - Thin slice, unenhanced, PV phase and 10-15 minute delay
    - 50% and 60% absolute washout
- MR - in- and opposed-phase imaging
  - Lipid rich adenomas - signal dropout with opposed-phase
- Gross fat (CT or MR)? – myelolipoma
- Note: appearance says *nothing* about adrenal excess function

- *So … #3: CT & MR appearance is another important determinant of managing adrenal incidentalomas*
MR in- and opposed-phase

- In-phase imaging: signal from H- atoms in water and lipid additive
- Opposed phase imaging: signal from H- atoms in water and lipid are diametrically opposed and subtract (water-fat)
  - Relies on balance of both types of signal
  - No MR criteria for lipid-poor adenomas
CT washout

- **Unenhanced CT**: if HU < 10, then stop = Lipid-rich adenoma
- **Absolute washout**: > 60% c/w adenoma (lipid poor) - spec 92%
  \[ \frac{\text{delay (unenhanced)}}{\text{enhanced (unenhanced)}} \]
- **Relative washout**: > 40% c/w adenoma - spec 92%
  \[ \frac{\text{delay}}{\text{enhanced}} \]
• Exclude myelolipoma and cyst

• Recommended clinical evaluation
  • 1-mg overnight dexamethasone suppression test (cushing’s)
  • Urinary or plasma metanephrines (pheo)
  • If HTN - serum K+ and aldosterone - plasma renin activity ratio (Conn)

• Recommended imaging evaluation
  • NCCT density measurement or in- opposed phase MR
  • Washout CT protocol

• Recommended surgery for lesions
  • Endocrine evidence of adrenal hyperfunction (some exceptions)
  • Tumors > 6 cm or tumors 4-6 cm if not closely followed

• Recommended FNA
  • History of malignancy and negative imaging for adenoma, other mets
ACR committee approach

- **Step 1**: exclude benign disease
  - Myelolipoma
  - Adenoma by CT or MR
- **Step 2**: size > 4 cm
  - PET, FNAB or resection
- **Step 3 (<4 cm)**: history & priors
  - Stable, no CA Hx - benign
  - Indeterminate - image
- **Step 4**: Adrenal CT or MR
  - Lipid rich / poor adenoma - 'stop'
  - Bx or PET - hx primary
- Consider biochemical assay
Practical (personal) approach

- **History** - What if any primary malignancy?
  - Endocrine issues - rarely available

- **Appearance**
  - Trauma / hemorrhage, myelolipoma - stop
  - Heterogeneous, > 10 HU, older - pursue … w/ imaging, PET or FNAB depending on hx, size & age

- **Size & Age**
  - Greater than 4 cm
    - CA hx – probable met. Work-up w/ PET / FNAB if clinically relevant
    - No CA hx - “adrenal mass” - biochemical assessment, resection
  - 2-4 cm – indeterminate range. Full workup, biochemistry, imaging
  - Small size (< 2 cm), young patient, no CA hx, stable, homogeneous
    - Likely adenoma - ignore possibility of mets / adrenal CA

- **Adenoma by imaging (CT or MR)**
  - suggest endocrine assessment - exclude hyperfunction
Case 3
Case 4
References

- Young WF. The incidentally discovered adrenal mass. NEJM 2007;356:601-610
- Song et al. The incidental adrenal mass on CT: prevalence of adrenal disease in 1,049 consecutive adrenal masses in patients with no known malignancy. AJR 2008;190:1163-1168
- Korobkin M et al. Differentiation of adrenal adenomas from nonadenomas using CT attenuation values. AJR 1996;166:531-536
- ACR Appropriateness criteria (draft March 2009)