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Adrenal Incidentaloma

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Case Presentation

- CC: right chest wall mass

- HPI: This is a 62 y/o male who presented to his PMD with a c/o a right chest wall mass. As part of work-up the patient underwent a CT scan of the chest which revealed an incidental right adrenal mass. He was subsequently referred to the surgical service for further work-up and management.

- PMHx: HTN, DM
- PSHx: drainage of right chest wall abscess
- Allergies: NKDA
- Meds: captopril, amlodipine, metformin, januvia
- SHx: non-contributory

- Vitals: Temp 98.4 F BP 165/86 HR 56 RR 16
  O2 sat 100%
- Physical Exam:
  General: AAOx3
  HEENT: NCAT, EOMI, right neck mass
  Chest: CTA bilaterally
  CVS: S1S2, rrr
  Abdomen: soft, +BS, NT, ND
  Back: left back mass, soft, mobile
  Extr: right shoulder mass, no edema or calf tenderness
  Rectal: good tone, no gross blood

- Labs:

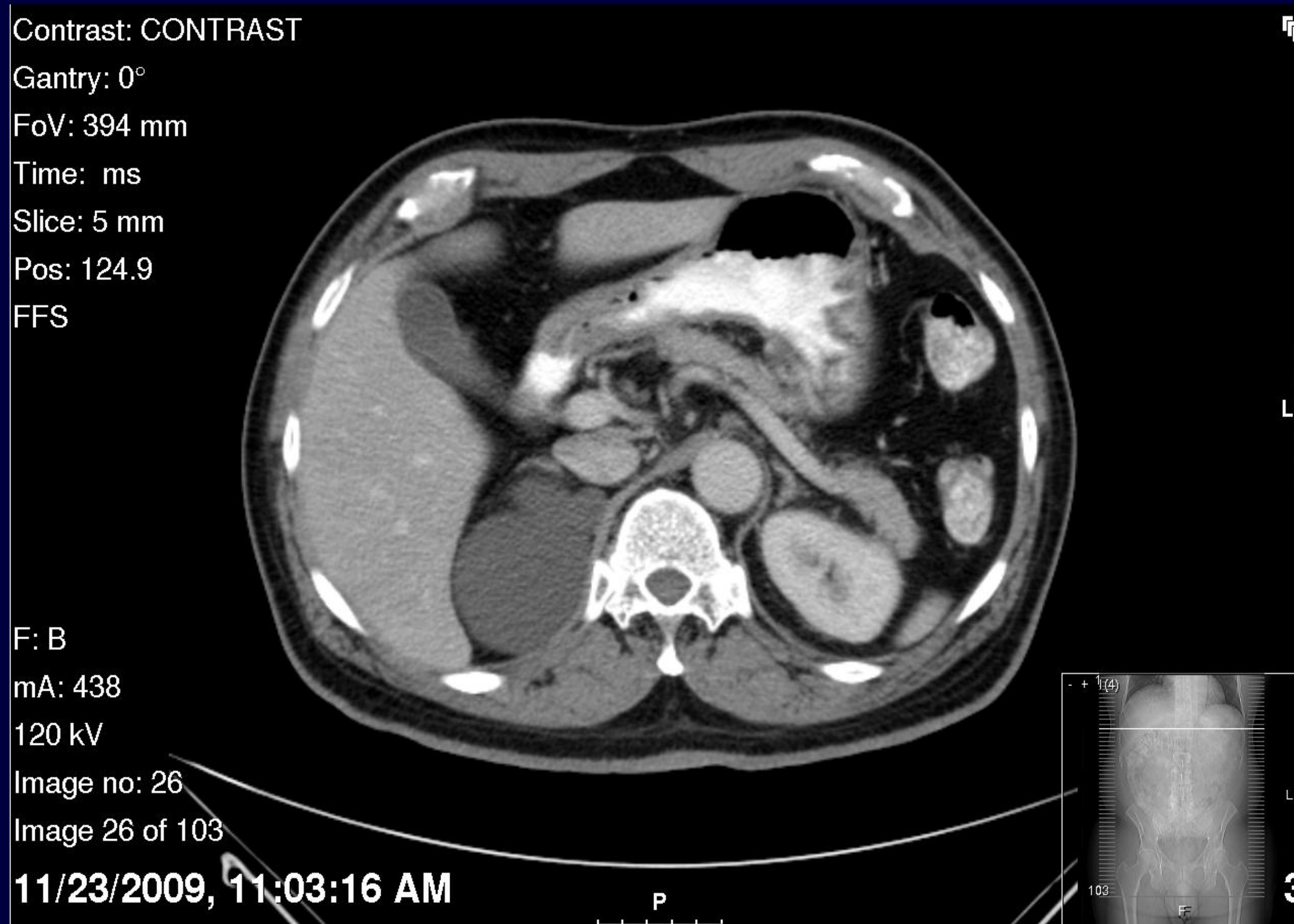
CBC: 6.63 / 13.3 / 40.1 / 298
Chem: 138 / 4.2 / 102 / 25 / 15 / 0.85 / 103
Coags: 9.8 / 26.0 / 0.9

Test	Result	Reference
VMA 24H urine	5.6 mg	(< / = 6.0)
VMA urine	2.5 mg	(1.1 – 4.1)
Metanephrines	134 µg	(90-315)
Normetanephrine	403 µg	(122-676)
Cortisol 24H urine	191.2 µg	(28.5 – 213.7)
Renin activity	0.32 ng/ml/hr	(0.25 – 5.82)
Aldosterone	3.0 ng/dl	(< / = 28)

- Radiologic Studies:

CT Abd/Pelvis: complex right adrenal cyst measuring approximately 7.4 x 5.1 x 7cm

- Radiologic Studies: CT scan of Abd/Pelvis



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- colonoscopy on 8/2010 normal
- pre-op for a laparoscopic adrenalectomy
- post-op course was uneventful. The patient tolerated the procedure well and was discharged home on POD #2.
- pathology : benign cystic lesion

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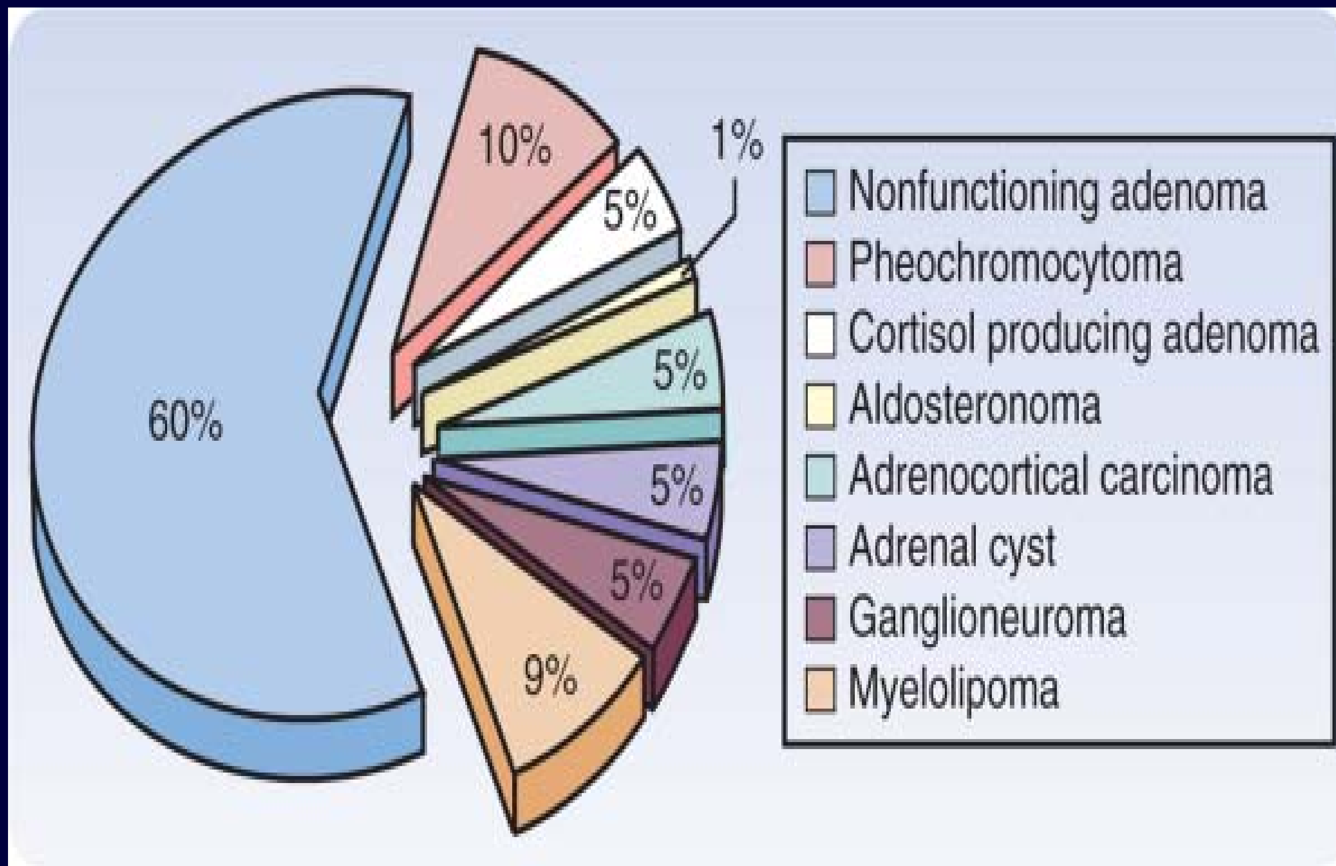
Management of Adrenal Incidentaloma

- Adrenal incidentaloma (AI): are clinically silent masses, measuring greater than 1cm in diameter, discovered incidentally at the time of imaging procedures performed for unrelated reasons.
- Prevalence of unsuspected adrenal masses detected on CT ranges from 1-5%
- The incidence has also increased with advancing age where 6.9% are discovered in individuals older than 70

Management of Adrenal Incidentaloma

- Differential Diagnosis:



Sabiston 18th Ed. Chapter 39

Management of Adrenal Incidentaloma

Approach to work-up and management of Adrenal Incidentaloma

- Is it functional or non-functional?
- Is it malignant or does the patient have a history of malignancy?
- Does size matter?

Management of Adrenal Incidentaloma

Is it functional or non-functional?

- Non-functional Cortical Adenomas

  - account for 60% or more of adrenal incidentalomas

  - characterized radiographically by their homogeneity and low attenuation (HU) on CT

  - most are < 4cm in size but may be up to 6cm in diameter

  - adrenalectomy is indicated for those larger than 4cm or with imaging characteristics that are atypical for an adenoma.

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Management of Adrenal Incidentaloma

Is it functional or non-functional?

- Functional (hormonally active) Adrenal Incidentaloma: include pheochromocytoma, cortisol producing adenoma, aldosteronoma

- Pheochromocytoma

  - account for approx. 5% of all incidentalomas
  - clinically silent except for the presence of HTN
  - spells of palpitations, tremor, HA, diaphoresis, anxiety are usually absent

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Management of Adrenal Incidentaloma

Is it functional or non-functional?

- Pheochromocytoma

    - diagnostic evaluation
        - plasma- fractionated metanephrines
        - 24H urine measurements of catecholamines and metanephrines

    - prior to surgical intervention
        - alpha-receptor blockade
        - beta blockade reserved for persistent tachycardia after alpha blockade.

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Management of Adrenal Incidentaloma

Is it functional or non-functional?

- Cortisol producing Adenoma

  - approx. 5-20% of patients have abnormalities in cortisol secretion without signs of Cushing's syndrome: Subclinical Cushing's Syndrome (SCS)

  - progression to Cushing's syndrome can range from 1.5 to 12.5 % in 1 year

  - tend to have a higher incidence of HTN (76%), diabetes (30%) and obesity (52%)

Management of Adrenal Incidentaloma

Is it functional or non-functional?

- Cortisol producing Adenoma

  - low-dose dexamethasone suppression test:
    - -1-3mg dexamethasone at 11pm; measure cortisol level at 8 am
    - - Normal individuals should suppress to <3μg/dl.
    - - Failure to do so warrant's further evaluation with either plasma ACTH levels or a 24H urine-free cortisol level

Management of Adrenal Incidentaloma

Is it functional or non-functional?

- Cortisol producing Adenoma

  - adrenalectomy is recommended: improvements with weight loss, blood pressure and blood glucose control

  - post-operative supplemental glucocorticoids should be given to prevent adrenal insufficiency

  - may take approx. 12 months for the pituitary-adrenal axis to recover normal function

Management of Adrenal Incidentaloma

Is it functional or non-functional?

- Aldosteronoma

  - should be screened for in any patient with HTN or hypokalemia

  - diagnosis: ratio of aldosterone to renin of >20 with a plasma aldosterone of 15ng/dl is suggestive of an aldosteronoma

  - 24H urine measurement of aldosterone with saline loading can be performed; aldosterone level of >12ng/dl is confirmatory

Management of Adrenal Incidentaloma

Is it malignant or does the patient have a history of malignancy?

- Adrenocortical Carcinoma

  - rare tumors with incidence of 1 in 1-1.5 million population

  - at presentation mean tumor size is large, approx. 90% are larger than 6cm

  - approx. 50% of adrenal cancers are hypersecretory

  - probability of an AI being a primary adrenal cancer increases with increasing size of the lesion

Management of Adrenal Incidentaloma

Is it malignant or does the patient have a history of malignancy?

- Adrenocortical Carcinoma

  - assessment for risk
    - size
    - radiographic characteristics: heterogeneous with areas of necrosis, hemorrhage or calcification. May also have irregular borders of local invasiveness or regional lymphadenopathy

  - open adrenalectomy

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Management of Adrenal Incidentaloma

Is it malignant or does the patient have a history of malignancy?

- Adrenal Metastases

  - cancers that MC metastasize to the adrenal gland: renal, lung, melanoma, breast and lymphoma

  - most mets are > 3cm in diameter and have imaging characteristics suspicious for malignancy

  - adrenalectomy is appropriate for solitary mets

Management of Adrenal Incidentaloma

Is it malignant or does the patient have a history of malignancy?

- Adrenal Metastases

  - PET maybe helpful to exclude extra-adrenal metastatic disease

  - FNA bx: only in those patients where tissue diagnosis will alter therapy; not warranted if lesion is amenable to resection; r/o pheochromocytoma prior to bx

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Management of Adrenal Incidentaloma

Does size matter?

-Yes, important variable in determining the malignant potential of the adrenal lesion

- recommended threshold for adrenalectomy for an AI based on size is 4cm

Radiologic Assessment

- CT scan
  - useful for lesion size, homogeneity, invasiveness and attenuation
  - adenomas: smooth, homogenous, well-circumscribed lesions with a low attenuation due to abundant intracellular lipid content, < 10 HU

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Management of Adrenal Incidentaloma

Radiologic Assessment

- carcinomas: irregular borders, heterogeneous, areas of necrosis, hemorrhage or calcifications with high attenuation, > 18 HU

- MRI
  - chemical shift imaging: uses the differential lipid vs. water content of adrenal masses

  - opposed-phase sequences the signal from protons in fat is subtracted from those in water, therefore benign lesions will have a low signal compared to malignant lesions

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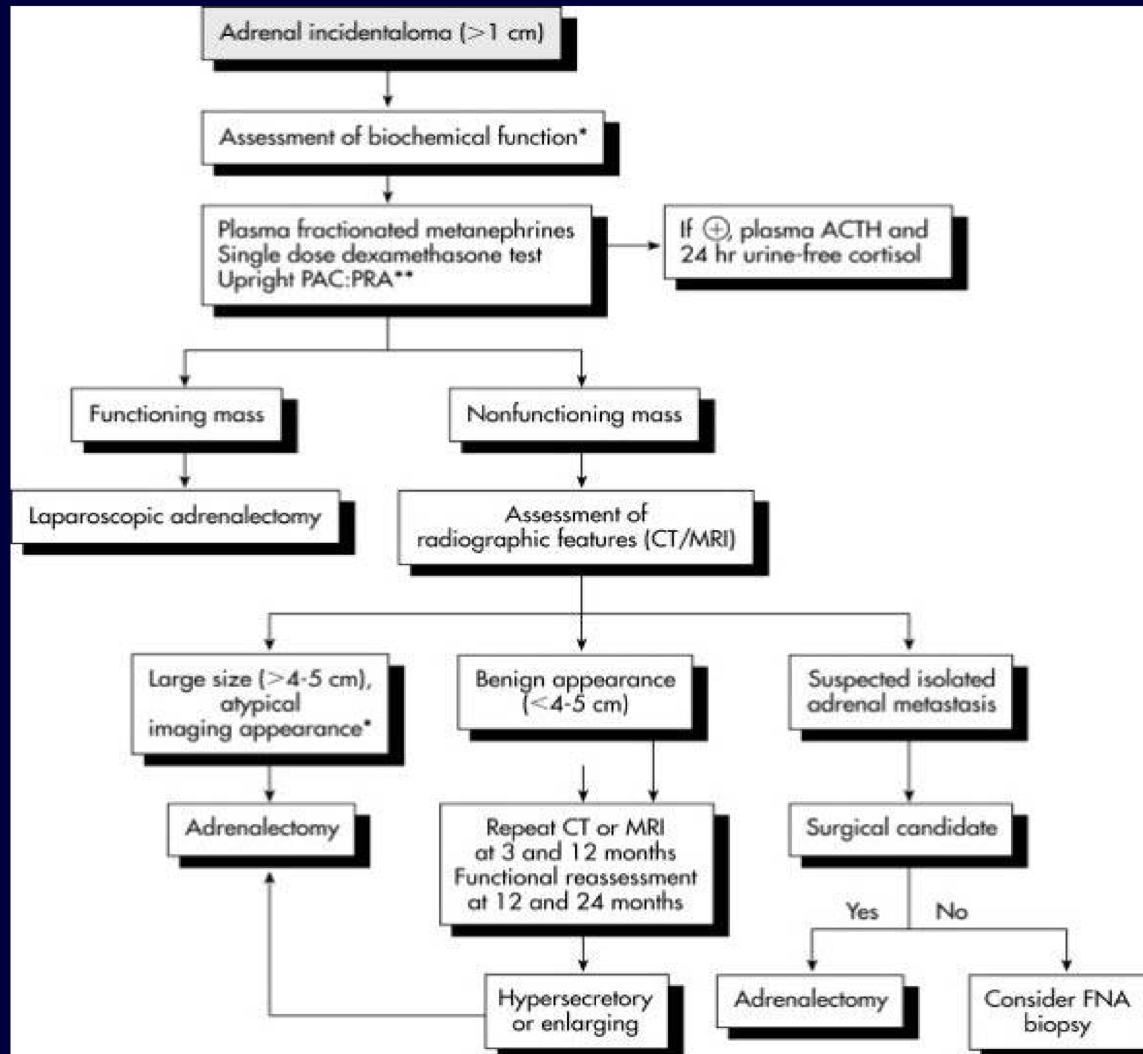
Management of Adrenal Incidentaloma

- Algorithm for Management of AI



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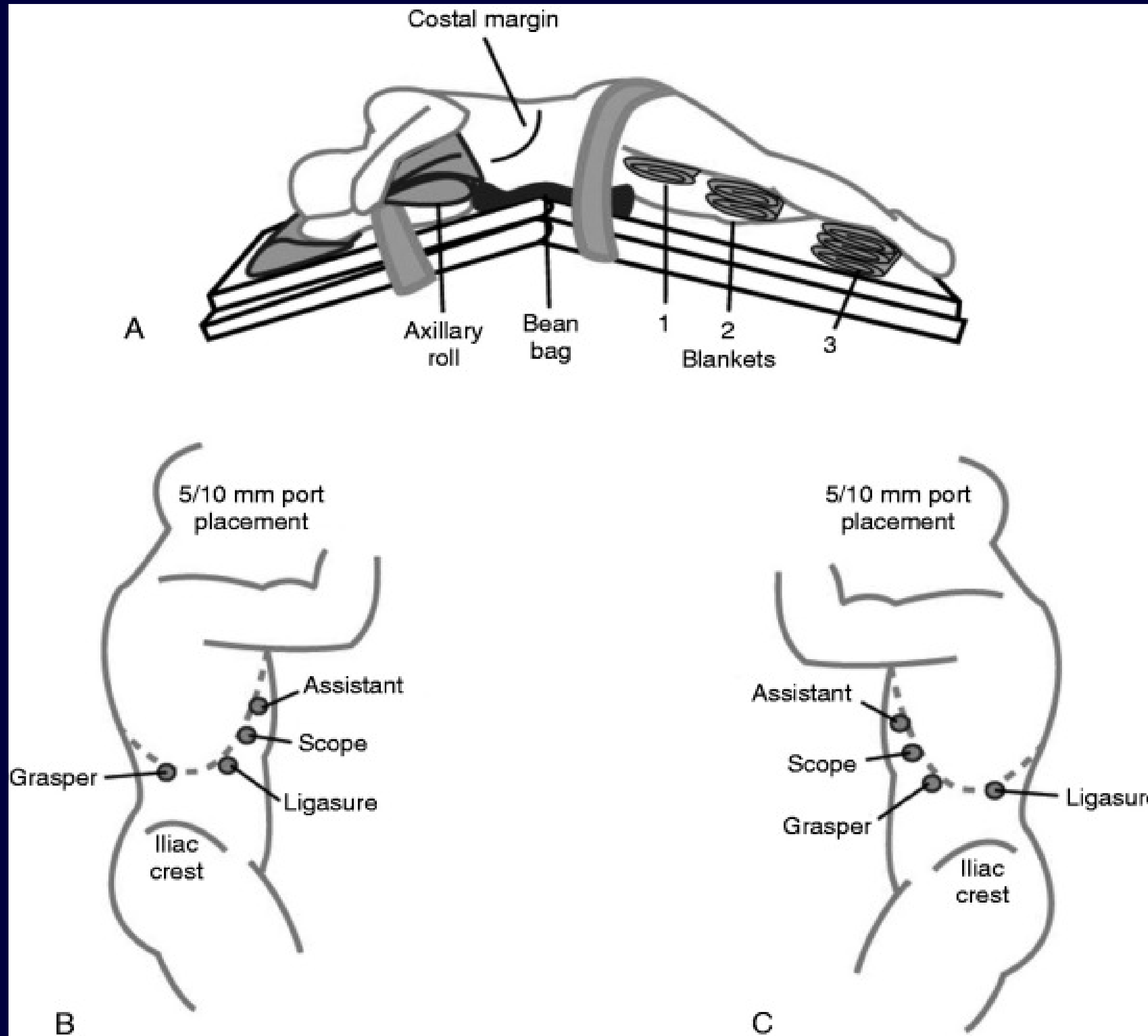
Management of Adrenal Incidentaloma

- Surgical Approach
  - Laparoscopic (lateral trans-abdominal, lateral, retroperitoneal)
  - Open (anterior, posterior, thoracoabdominal)
- Laparoscopic approach:
  - procedure of choice for adrenal tumors
  - better outcome compared to open approach (decreased length of stay and post-op pain, fewer complications, faster recovery)
  - contraindications: locally invasive tumor, regional LN mets, large AC cancer

Management of Adrenal Incidentaloma

- Laparoscopic Trans-Abdominal Approach – patient positioning



Cameron 9th Ed pg 589

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Management of Adrenal Incidentaloma

- Laparoscopic Technique (Trans-abdominal approach)

- Step 1: Exposing the adrenal gland - Incise the lateral attachments to allow medial rotation of either the spleen/pancreas or liver and dissect peritoneum free

- Step 2: Dissection of adrenal gland - Starting with the most cephalad attachments to the diaphragm and moving toward the renal hilum

  – *Identify the adrenal vein*

- Step 3: Mobilizing free the adrenal gland from the renal hilum - Be careful not to ligate a superior pole vessel to the kidney because this may cause postoperative hypertension

- Step 4: Completing the adrenalectomy - Cut through the fat between the kidney and adrenal gland using the LigaSure , harmonic scalpel, or cautery.

Cameron 9th Ed pg 590

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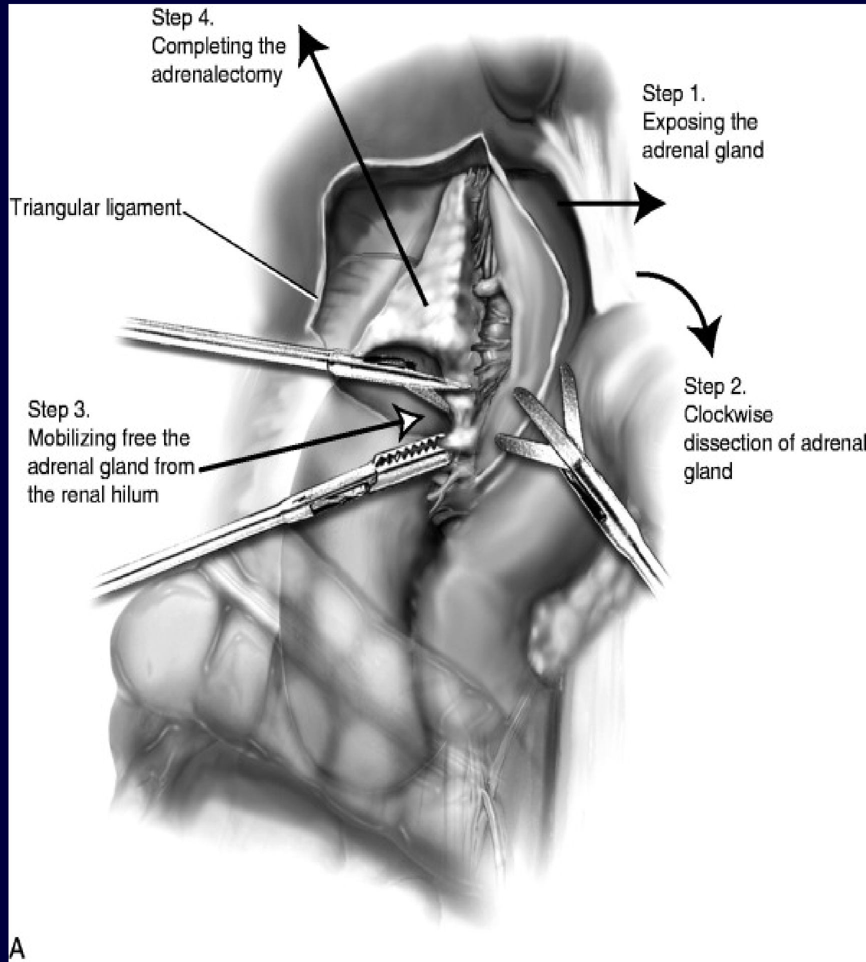
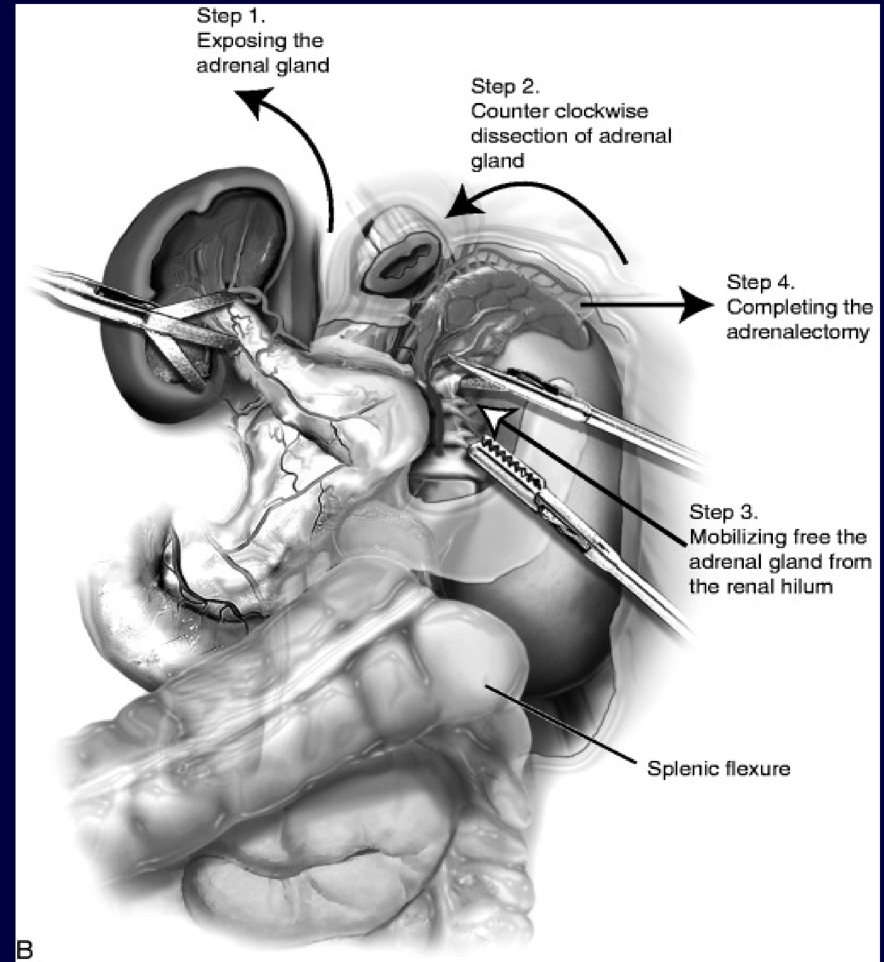
Management of Adrenal Incidentaloma

- Laparoscopic Trans-Abdominal Approach



A. Right Adrenalectomy



B. Left Adrenalectomy

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Management of Adrenal Incidentaloma

Evaluating and Managing Adrenal Incidentalomas

Hamrahian, AH et al., Cleveland Clinic Journal of Medicine.

2006; vol 73, pgs 561-568

- case based approach to evaluating and managing AI
- Approach – Is it malignant? Is it functional?
- Work-up – History and Physical, Imaging and Hormonal studies
- Threshold for surgical intervention after completion of hormonal and imaging studies: 6cm
- If mass <6cm and nonfunctional – repeat imaging in 6-12 months
  - no change yearly evaluation for hormonal secretion
  - change ≥ 1cm surgical intervention

Management of Adrenal Incidentaloma

- Conclusions:

  - The incidence of AI have increased with the use of high-resolution imaging studies as well as with age

  - The general approach for the work-up and management of AI is based on 3 pertinent questions:
    Is it functional or non-functional?
    Is it malignant or does the patient have a history of malignancy?
    Does size matter?

  - Laparoscopic approach is surgical management of choice