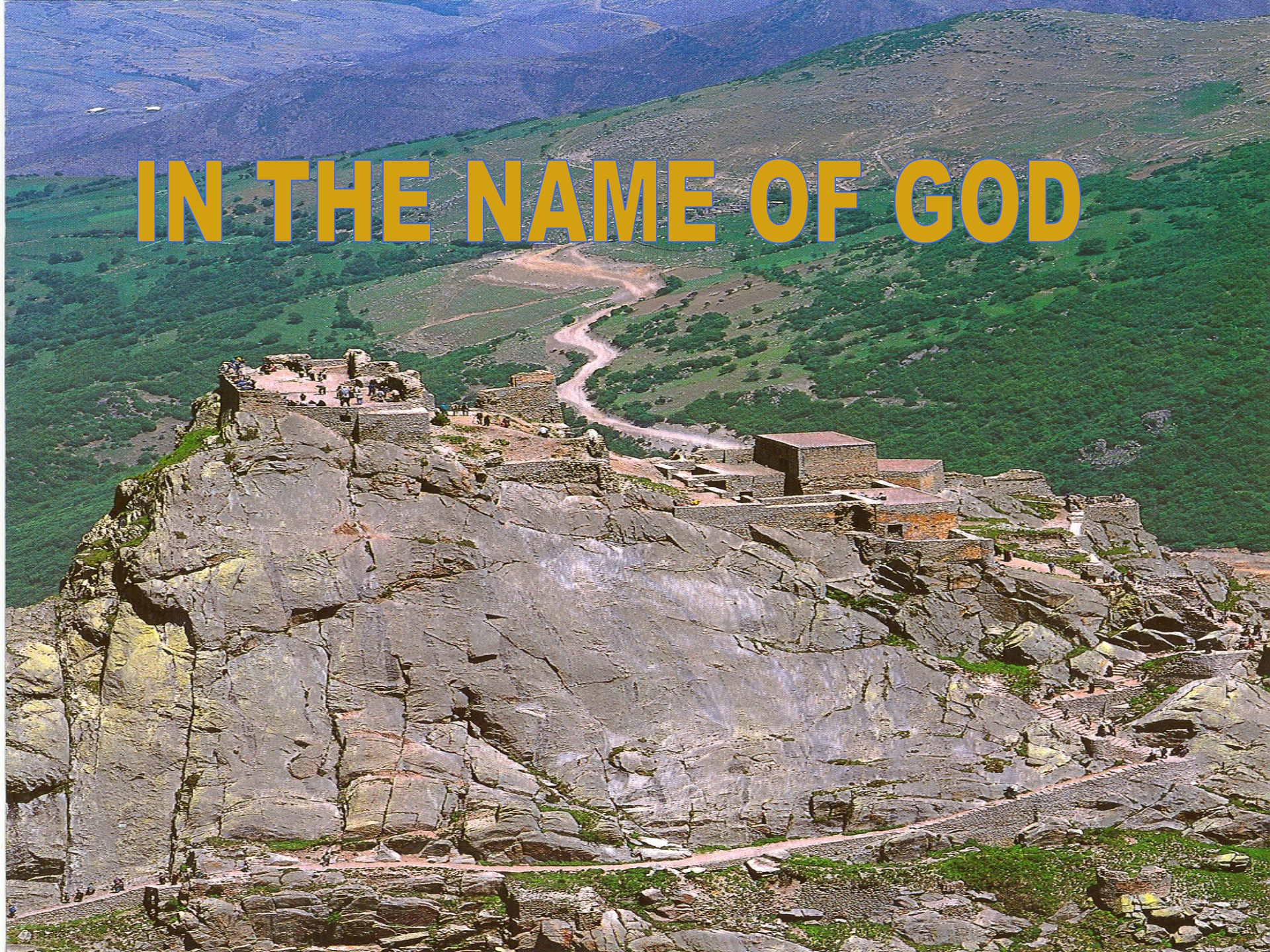
IN THE NAME OF GOD

Adrenal Incidentaloma

(Incidentally Discovered Adrenal Mass)

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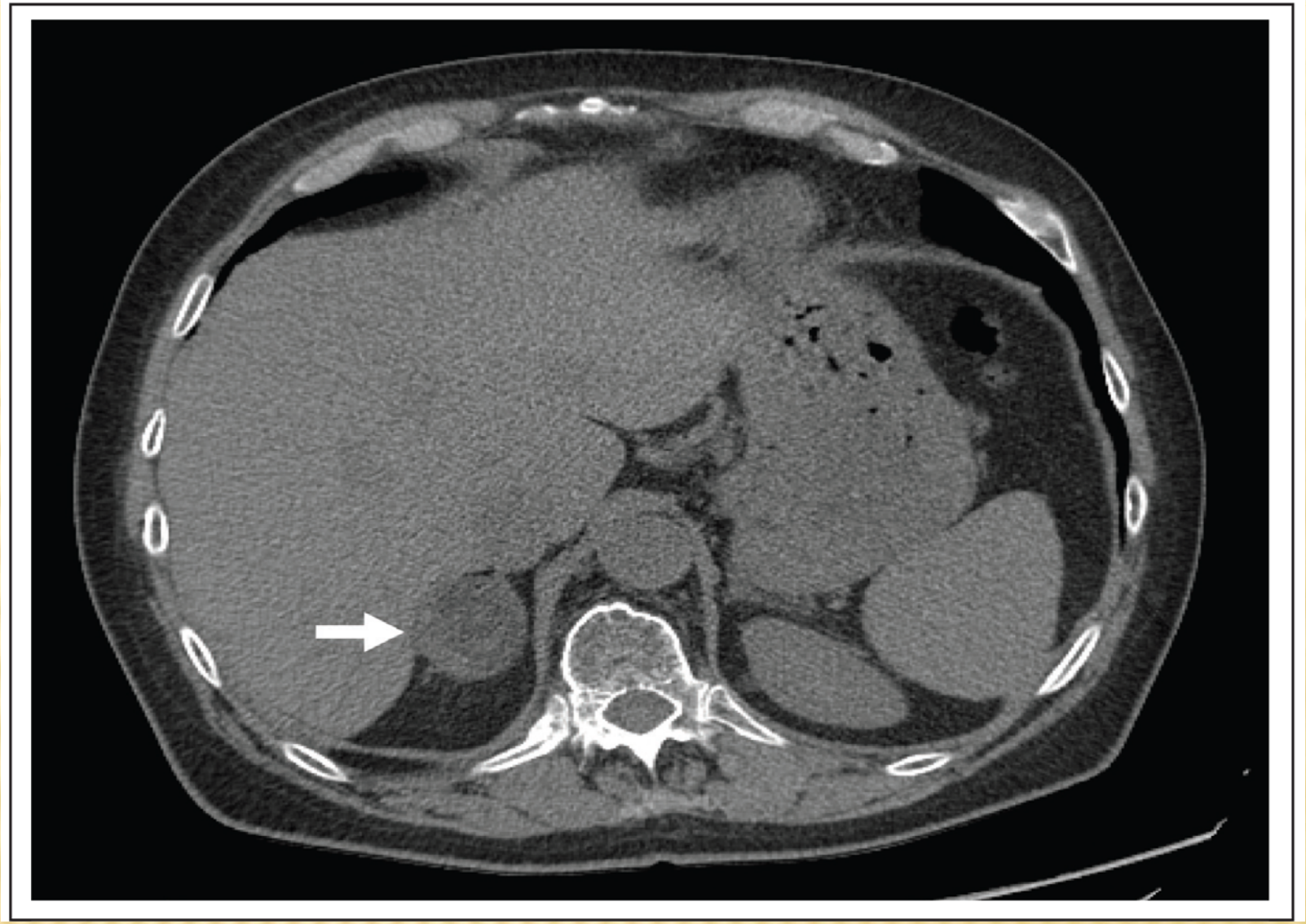
Case Presentation 1

A 68-year-old man with a history of osteoporosis, hyperlipidemia, and prediabetes was incidentally found to have a right-sided adrenal mass (<10 HU on unenhanced CT imaging), size 4.6 × 3.5 × 3.5 cm, on a CT scan performed to evaluate back pain. there was no evidence of supraclavicular fat pads, striae, or proximal muscle weakness. Biochemical evaluation excluded pheochromocytoma and primary hyperaldosteronism. Laboratory data showed an undetectable morning ACTH, a morning cortisol 7.6 µg/dL following 1-mg overnight DST. A normal 24-hour UFC and a low DHEAS.



Noncontrast axial computed tomography image showing a well-circumscribed 4.6 × 3.5 × 3.5 cm lipid-rich (<10 Hounsfield units) right adrenal mass with no evidence of calcifications or local invasion.

1. Does this adrenal mass represent a malignancy?

2. Is there evidence for clinically relevant and autonomous adrenal hormone excess?

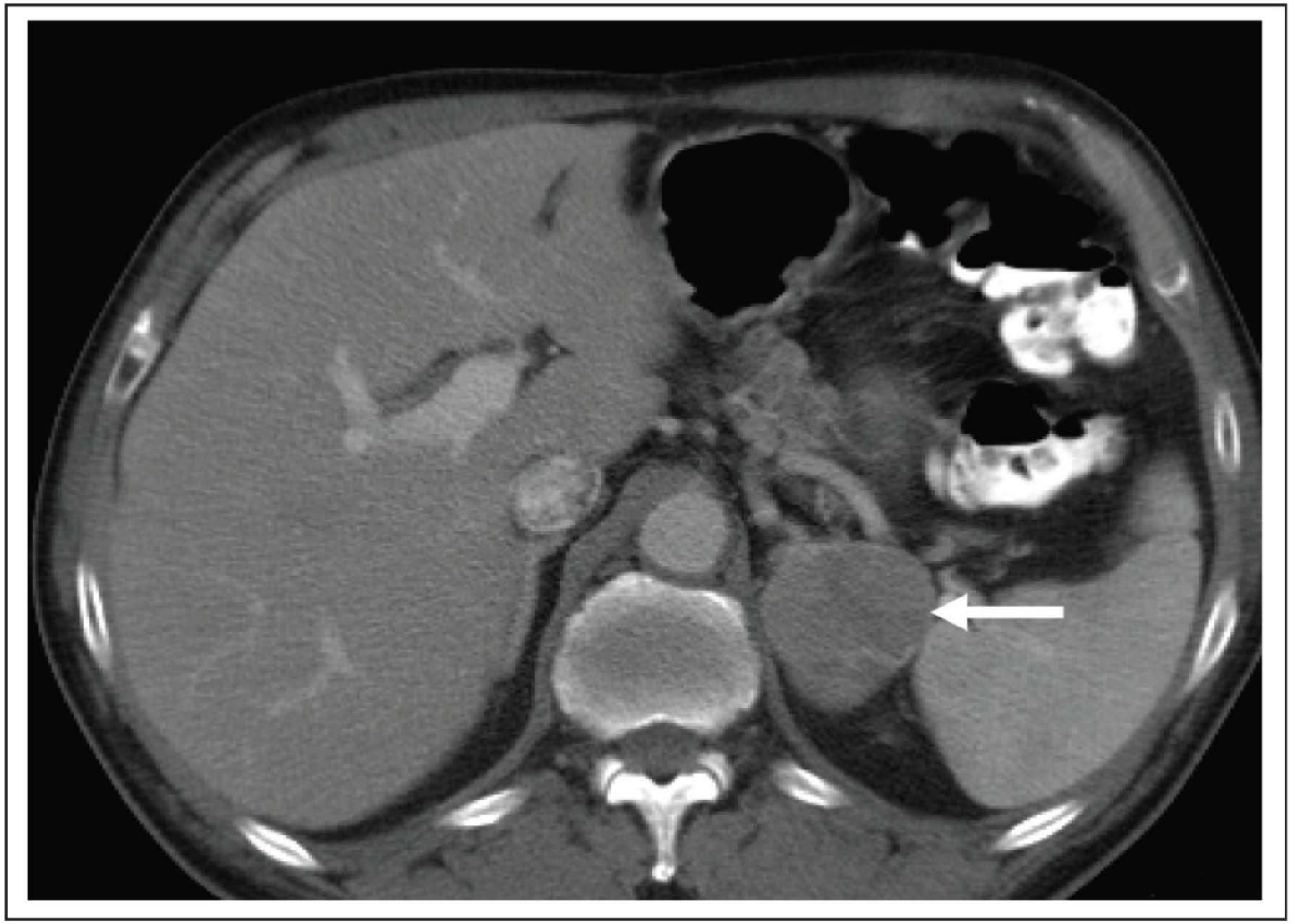
3. Would a biopsy of the adrenal mass help with diagnosis or management?

4. Is there an indication for surgical or medical treatment

5. Is there an indication for longitudinal surveillance with imaging and/or biochemical testing? If so, how frequently and for what duration?

Case Presentation 2

A 65-year-old man with a history of depression and osteoarthritis was found to have a lipid-poor adrenal mass that was 5.0 × 4.5 × 5.0 cm on a CT scan performed to evaluate back pain. The mass was lobular and heterogeneous, with a noncontrast CT attenuation of 55 HU. Physical examination showed no supraclavicular fat pads, striae, or proximal muscle weakness. Biochemical evaluation revealed normal plasma metanephrines and aldosterone-to-renin ratio. However, the patient had an abnormal dexamethasone suppression test, with a post-test cortisol of 8 µg/dL. DHEAS was elevated at 550 µg/dL



Postcontrast transverse computed tomography image showing a 5.0 × 4.5 × 5.0 cm lipid-poor (>10 Hounsfield units on noncontrast computed tomography) heterogeneous left adrenal mass and lobular contour.

1. Does this adrenal mass represent a malignancy?

2. Is there evidence for clinically relevant and autonomous adrenal hormone excess?

3. Would a biopsy of the adrenal mass help with diagnosis or management?

4. Is there an indication for surgical or medical treatment

5. Is there an indication for longitudinal surveillance with imaging and/or biochemical testing? If so, how frequently and for what duration?

Clinical Key Questions

1. What is the prevalence of adrenal incidentaloma, and what is the frequency of malignant tumors and functional tumors among adrenal incidentaloma patients?

2. What testing is required when an adrenal incidentaloma is found?

3. What testing is to be performed if an additional test is needed for an adrenal incidentaloma?

4. What is the confirming test when the adrenal incidentaloma is a functional tumor?

5. What is the treatment if the adrenal incidentaloma is a functional tumor?

6. What clinical findings suggest malignancy in an adrenal incidentaloma?

7. When is surgery indicated in adrenal incidentaloma?

8. How should a non-functioning benign adrenal incidentaloma be monitored?

Adrenal incidentaloma:

Definition and Prevalence

Adrenal incidentaloma is an incidentally discovered adrenal lesion that is detected on imaging performed for indications other than evaluation for adrenal disease.

Among adults, the prevalence of adrenal incidentaloma has been reported to be1 to 6%, The prevalence is higher among older adults.

Adrenal incidentaloma:

Clinical consequences

•Most adrenal incidentalomas are nonfunctioning benign tumors.

•**75%** are nonfunctioning cortical adenomas.

•approximately **14%** of adrenal incidentalomas are functional tumors that secrete excess adrenal hormones.

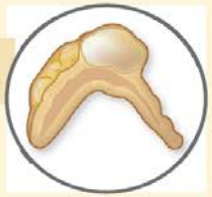
•Other masses with clinical significance are pheochromocytomas **(7%)**

•primary adrenal cancers or metastases to the adrenal glands **(4%).**

•In adrenal incidentaloma the key clinical questions are:

•whether it is functioning and

•whether it is malignant.



CT/MRI finding of adrenal mass

Assess in parallel

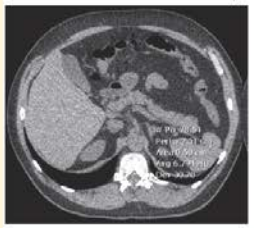
Is this a malignancy?

Is this biochemically active?

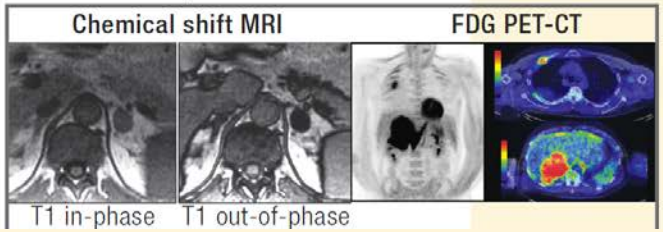
Non-contrast CT adrenal (1st line)

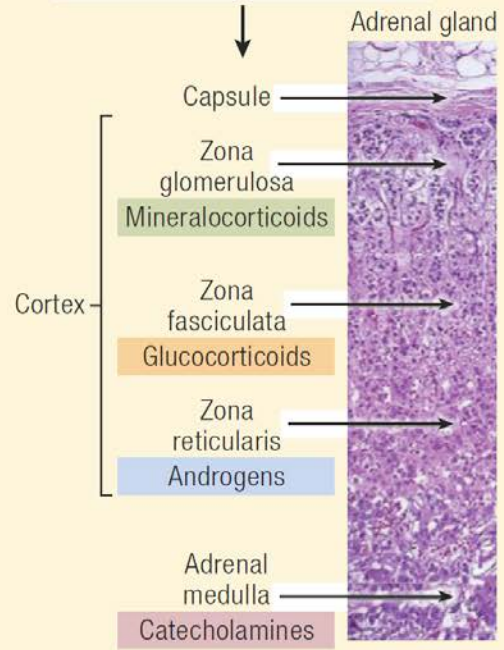
Benign Features	Indeterminate or suspicious for malignancy
Size < 4cm	Size > 4 cms
Hounsfield unit < 10	Heterogeneous
Homogenous density	Hypervascularity
	Hounsfield unit >10

Benign radiology



Is this a malignancy?
Further investigations may be required or patient goes direct to surgery





Clinical Assessment

Biochemical assessment of adrenal hyperfunction

- 1mg Overnight dexamethasone Suppression test
- Autonomous cortisol hypersecretion?
- Plasma or urinary metanephrines
- Aldosterone/renin ratio
- Adrenal androgens

Classification of Mnilateral Adernal Masses

MASS	APPROXIMATE PREVALENCE (%)
Benign	
Adrenocortical adenoma	
Endocrine-inactive	60–85
Cortisol-producing	5–10
Aldosterone-producing	2–5
Pheochromocytoma	5–10
Adrenal myelolipoma	<1
Adrenal ganglioneuroma	<0.1
Adrenal hemangioma	<0.1
Adrenal cyst	<1
Adrenal hematoma/hemorrhagic infarction	<1
Malignant	
Adrenocortical carcinoma	2–5
Malignant pheochromocytoma	<1
Adrenal neuroblastoma	<0.1
Lymphomas (including primary adrenal lymphoma)	<1
Metastases (most frequent: breast, lung)	1–2

The Differentiol Diagnosis of on Incidentally Discovered Adrenal Mass

	Nonfunctional	Functional
BENIGN	Adrenocortical adenoma Cyt Hemangioma Hemorrhage Infections and granulomatous disease (tuberculosis, fungi, sarcoidosis) Lymphangioma Myelolipoma Pheochromocytoma Schwannoma	Adrenocortical adenomas *Aldosterone producing* *Cortisol producing* *Androgen producing* Micro-or Macronodular disease *Aldosterone producing* *Cortisol producing* Pheochromocytoma Myelolipoma Ganglioneuroma
MALIGNANT	Adrenocortical carcinoma Metastatic cancer from a nonadrenal primary neuroblastoma	Adrenocortical carcinoma Pheochromocytoma

Q. What clinical findings suggest a malignancy in adrenal incidentaloma?

The following indicate malignant adrenal incidentaloma.

♦ When it is large (≥4 cm).

♦ When the Hounsfield unit (HU) value is high on a non-contrast CT scan (≥10 HU).

♦ When the contrast washout rate is low in the delayed view of a contrast CT scan (absolute washout <60%, relative washout <40%).

♦ If the margin of the tumor is irregular, the contents are not homogeneous, there is non-uniform enhancement, or if there is surrounding tissue invasion or metastasis.

♦ When there is an abnormal increase in metabolites of steroids, such as dehydroepiandrosterone sulfate (DHEA-S).

Radiographic characteristics Suggestive of Bening Versus Malignant Adrenal Masses

Characteristics	Likely benign	Potentially malignant
Irregular shape	No	Yes
Heterogeneous content	No	Yes
Necrosis or calcifications	No	Yes
Rate of growth	<1 cm/year	≥ 1 cm/year
Attenuation on unenhanced CT	< 10 HU	>10 HU
Contrast washout on CT protocol at 15 minutes	Absolute > 60% Relative > 40%	Absolute > 60% Relative > 40%
MRI chemical shift suggestive of lipid-rich content	Yes	No
FDG avidity on PET	No	Yes
Size	<4 cm	≥4-6cm

Essential Points

- **The initial imaging of choice is an unenhanced computed tomography scan of both adrenal glands**
- **Pheochromocytoma and autonomous cortisol secretion should be excluded in every case and aldosteronism in patients with underlying hypertension and/or hypokalemia**
- **A causative link between cortisol hypersecretion and age-related comorbidities should be firmly established before recommending surgical excision**

Essential Points

- **Patients with mild autonomous cortisol excess and hyperaldosteronism may benefit from adrenalectomy, but treatment should be individualized.**
- **Nonfunctioning adrenal tumors that have an attenuation of 10 Hounsfield units or less on CT evaluation and that are smaller than 4 cm in greatest diameter generally do not warrant intervention or long-term follow-up.**
- **The management of these masses should be individualized and should involve a multidisciplinary team consisting of an endocrinologist, an endocrine surgeon, and a radiologist.**

Recommended Biochemical test to evaluate for Adrenal Hormone Excess in a Patient With an Incidentally Discovered Adrenal Mass

Condition	Patients to Test	Test	Abnormal Value
Autonomous Cortisol secretion	All	1-mg Dexamethasone suppression test	Nonfunctional ≤1.8 µg/dL Possibly functional1.9-5µg/dL Autonomous hypercortisolism:>5.0µg/dL
Primary aldosteronism	Hypertension and/ or hypokalemia	Serum aldosterone to plasma renin activity ratio (ARR)	Suppressed renin ARR>20-30
Pheochromocytoma	Lipid-poor, contrastavid, heterogeneous adrenal masses	Plasma(or urinary) fractionated metanephrines	Greater than 2-to 4-fold higher than the upper limit of the reference range
Adernal androgen excess	Hirsutism or virilization	DHEAS Total testosterone	Higher than the upper limit of the reference range

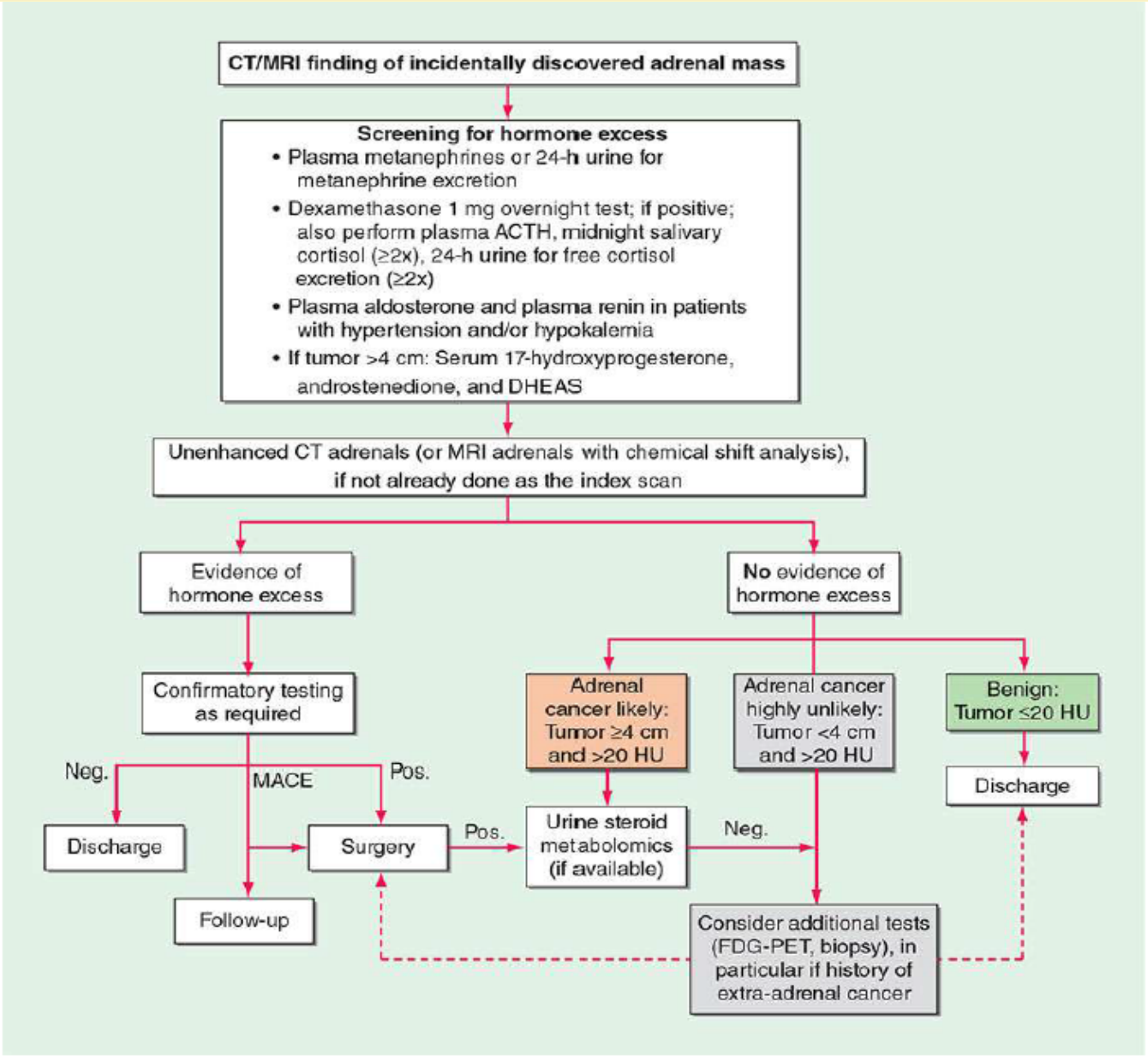
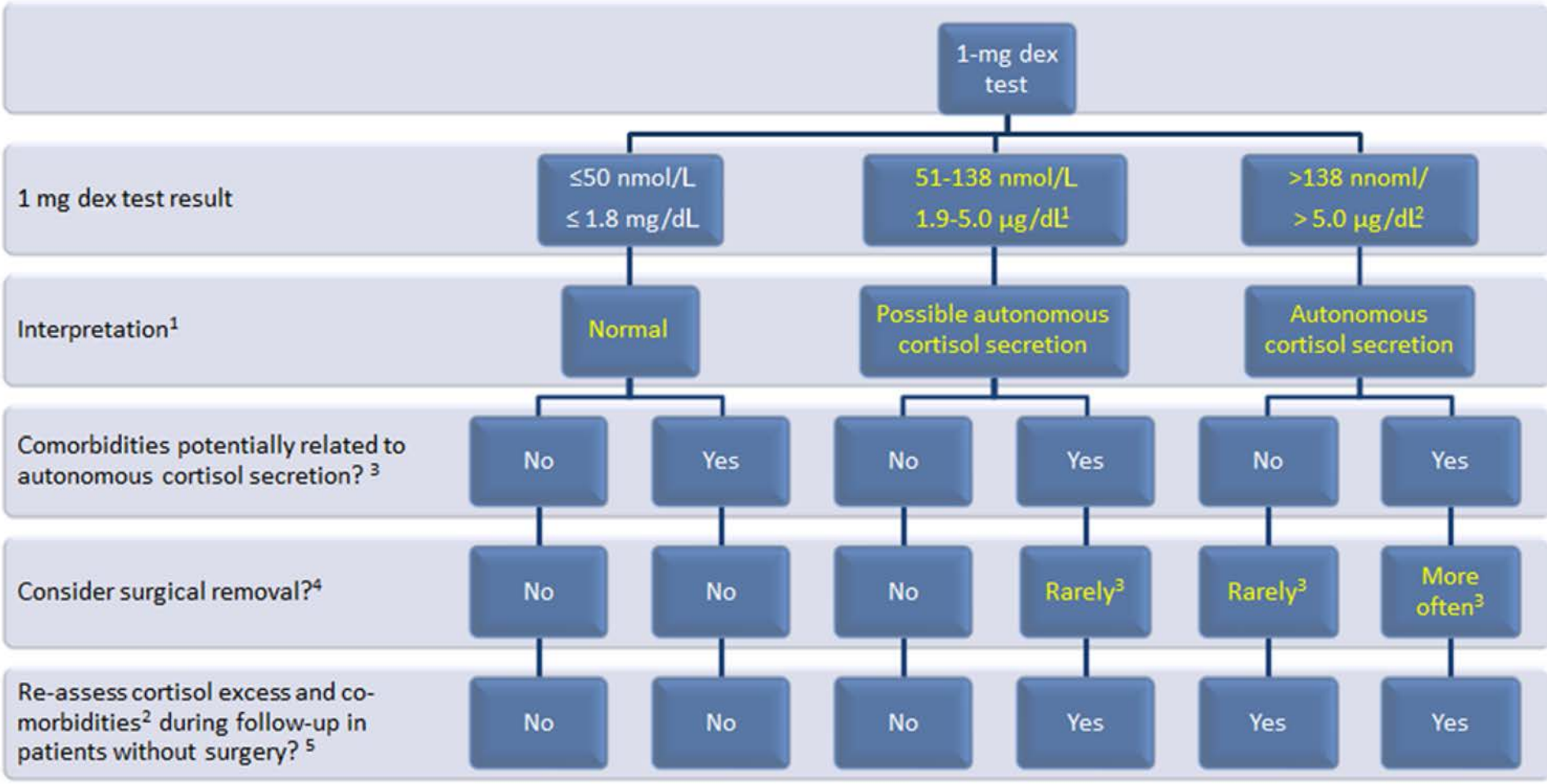


FIGURE 386-13 Management of the patient with an incidentally discovered adrenal mass. ACTH, adrenocorticotropic hormone; CT, computed tomography; FDG-PET, fluorodeoxyglucose positron emission tomography; MACE, mild autonomous cortisol excess; MRI, magnetic resonance imaging.



Assessment and management of ‘autonomous cortisol secretion’ in patients with adrenal incidentalomas.

Adrenal Incidentaloma

Suggested Readings:

1. Adrenal Incidentaloma, N Engl J Med 2021;384:1542-51

2. The evaluation of incidentally Discovered Adrenal Masses, Endocrine Practice Vol 25 No. 2 February 2019

3. Adrenal Incidentaloma, Endocrine Reviews; December 2020, 41(6):775–820

4. Management of adrenal incidentalomas: European Society of Endocrinology Clinical Practice Guideline in collaboration with the European Network for the Study of Adrenal Tumors, Clinical Practice Guideline 2016; 175: G1-G34

5. CT Characteristics of Pheochromocytoma: Relevance for the Evaluation of Adrenal Incidentaloma, J Clin Endocrinol Metab, February 2019, 104(2):312–318

6. Unenhanced CT imaging is highly sensitive to exclude pheochromocytoma: a multicenter study, European Journal of Endocrinology (2018) 178, 431–437

7. Clinical Guidelines for the Management of Adrenal Incidentaloma, Endocrinol Metab 2017;32:200-218


Thank you for your attention