The Adrenal Gland

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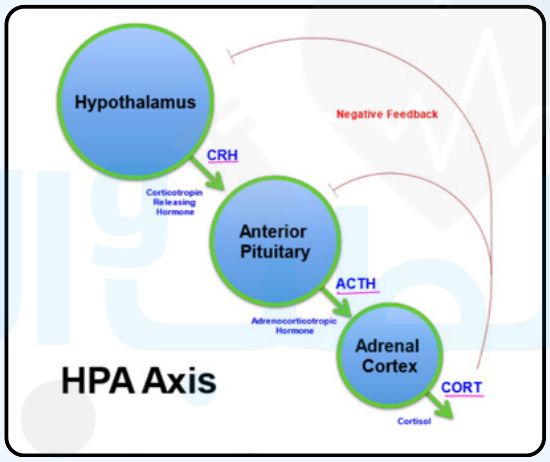
THE ADRENAL GLANDS

· Adrenal cortex:
· Zona glomerioloza… Mineralocorticoids,
· Zona fasciculata……Glucocorticoids
· Zona reticularis…….Sex Hormones
· Adrenal medulla : Adrenaline,Noradrenaline, Dopamine

Hypothalamic – pituitary – adrenal axis



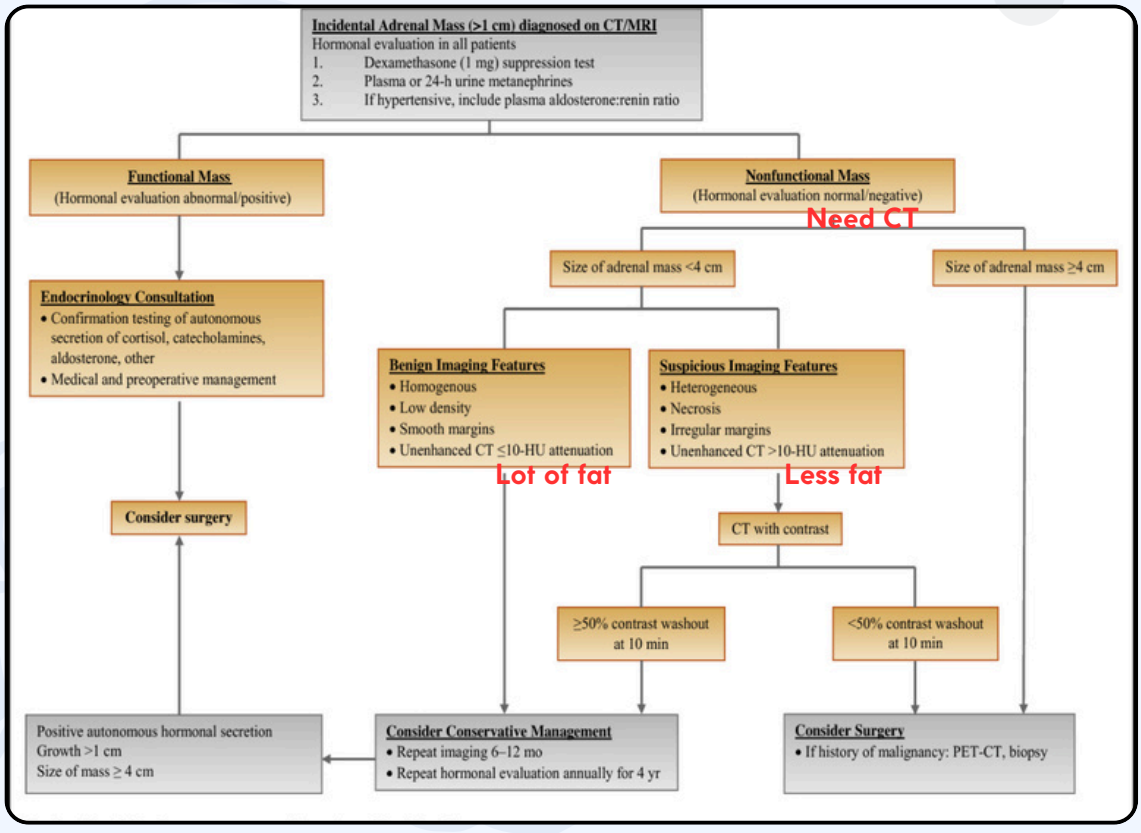
Adrenal mass: –> functioning –> secrete hormone
–> non functioning–> dosen't secrete hormones

Is called

Adrenal incidentaloma (non-functional)

Non- functional adrenal mass More than 1 cm / Asymptomatic / Found incidentally

Diagnosed by radiological imaging



Functional Adrenal Abnormalities

· Benign or malignant tumors or hyperplasia Increase size of cells
· Cortex : Cortical tumors :
· Cortisone secreting tumors-Cushing's Syndrome
· Aldosterone secreting tumors- Conn's Syndrome
· Sex hormone secreting tumors- Virilisation or Feminization.

Diffuse Hyperplasia

· Primary or a consequence of stimulation by trophic hormones leading to hypercortisism , Conn's disease or Adrenogenital syndrome

Medulla

· Tumors secreting adrenaline/nor-adrenaline(Phaeochromocytoma)

Cushing's Syndrome

=Primary adrenal disease:
· Adenoma
· Carcinoma
· Primary adrenal hyperplasia " ACTH independent
=Secondary adrenal disease: Stimulation from out of the gland
- Primary pituitary micro-adenoma Mainly ACTH dependent
-Non pituitary source " Ectopic ACTH syndrome "

Cushing's Syndrome

· Definition: Excess circulating cortisol that occurs as a result of endogenous steroid hyper secretion, due to:
ACTH dependent or ACTH_ independent disease Or exogenous steroid medication.

ACTH-Dependent

1. Pituitary microadenoma. most common
2. Ectopic ACTH secretion:
a) Small cell carcinoma b) Fore gut carcinoid
c) Ectopic CRH Syndrome:
Medullary thyroid tumor/ Pancreatic neuro-endocrine tumors

ACTH Independent

- Adrenocortical Adenoma Benign
- Bilateral nodular hyperplasia
- Adrenal carcinoma Malignant

Cushing's Syndrome

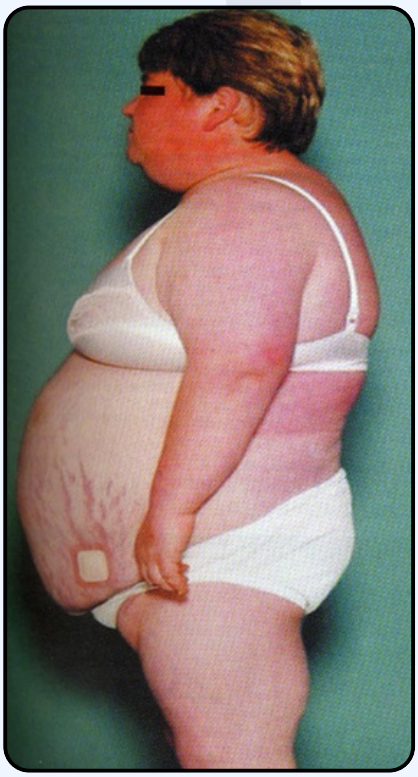
- Physiological and bodily changes caused by excess of circulating cortisol:
- Commonest cause is iatrogenic: administration of steroids for the treatment of other diseases.

Action of glucocorticoids

- Glucose metabolism
- Peripheral glucose utilization
- Lipid metabolism
- Cells of immune system
- Mediators of inflammation
- Bone and minerals metabolism
- Soft tissue and skeletal growth
- Fluid and electrolytes homeostasis
- CNSystem

Clinical presentation

- Obesity
- Loss of connective tissue
- Hirsutism and Virilism
- Muscle weakness
- Osteoporosis
- Hypertension
- Glucose intolerance
- Psychological changes



Ectopic ACTH Secretion

· Rapid evolution of the Cushing;s
· Symptoms of the primary disease:
-Small cell carcinoma of the lung
-Carcinoid
-Medullary Ca of Thyroid
-Other primary carcinomas

Investigations:

· 1 : Biochemical diagnosis
· Persistent increase in cortisol concentration.
· Cortisol suppression by dexamethasone In cushing patients cortisol dosen't decrease
· Resistancy to insulin administration
· 2 : Establishment of the cause
· Low ACTH = Adrenal disease
· High ACTH = Extra- adrenal cause As small lung cancer

Anatomical details مهم

· Pituitary: Skull X ray/ CT /MRI
· Adrenals: US/ CT/ MRI
· Scintigraphy : cholesterol scan // NP59 scan For cushing patients
· Search for ectopic ACTH source : CT chest/ Angiography

Plan of Management

Adrenal disease need post and pre Op care
due to hormones which can't stop it suddenly

· Pituitary adenoma : Microadenectomy
· Hyperplasia : Bilateral adrenalectomy
· Solitary ademoma: Unilateral adrenalectomy

Adrenocortical Carcinoma

· Rare
· Any age 4-5th decades
· 60% : no important secretory function
· Benign or Malignant ? Pain / Weight loss/ Weakness/ Fever
· Functional tumors present depending on their type of secretion .

Treatment

· When possible Surgical resection
· Radiotherapy
· Chemotherapy

Aldosteronism <Conn's Syndrome>

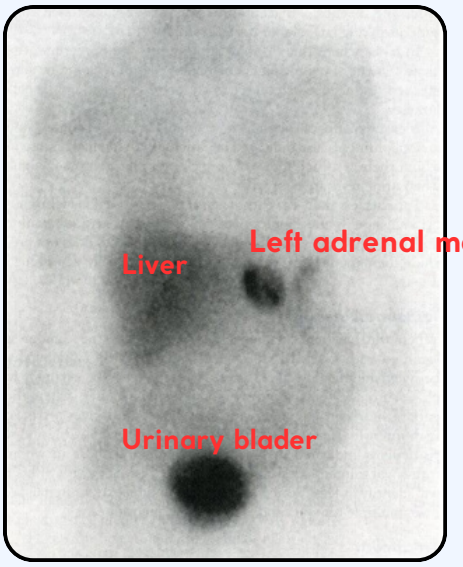
· Primary due to :
1) tumor(Adenoma) 2) nodularity 3) hyperplasia
-Secondary due to:Excess stimulation by Angiotensin
Commonest cause is :
"Aldosterone producing Adenoma "
Incidence: Females more than males
30–60 years of age
1% of patients investigated for hypertension

Pathophysiology

· Aldosterone :
Promotes sodium absorption / Promotes water retention
Increase potassium secretion Hypokalemia not hyponatremia

Clinical features :

Clinical suspicions should be raised when Hypertension occur with hypokalemia.
·Moderate to severe hypertension
·Hypokalemia
·Muscle weakness
·Malaise
·polydipsia



Investigations

· Blood : Hypokalemia
Plasma aldosterone
· Urine : Increase urinary potassium
· Imaging : US/ CT/ MRI
Iodocholesrerol isotope / scan / Adrenal vein sampling From (Rt and Lt) vein
Specific for Conn's syndrome

Treatment
· Spironolactone K+ sparing
· Adrenalectomy

Phaeochromocytoma :
Phaeochromocytoma
Neuroblastoma
Paraganglioma
Ganglioneuroma
Are derived from the neural crest —> Arise more than tumor from it
· 90% ---solitary – adrenal
· 5 –10% bilateral
· 10%---Exrta-adrenal

Pheochromocytoma---> Disease of 10%:
-multible
-bilateral
-extraadrenal
-malignant

· 0.1% of patients investigated for hypertension
· Average size is 5 cm
· Discovered early because of catecholamines effects
· 10% are malignant
· Mostly secrets adrenaline

Symptomatology
· Palpitation
· Hypertension
· Sweating and pallor
· Anxiety
· Chest pain & weakness 50%
· Attacks often occur spontaneously but may be precipitated by vigorous exercise, Alcohol, tobacco and drugs : Anesthesia, phenothiazines & tricyclic antidepressants.

Clinical associations
* Multiple endocrine neoplasia type 2 Phaeo , medullary thyroid ca, hyperparathyroidism
* Neorofibromatosis . 10% of patients with neurofibromatosis may develop phaeochromocytoma

Investigations

Adrenaline is broken in urin

· A– 24 hours urinary vanyl mandilic acid (VMA) 60% sensitive.
· Urinary catecholamines . 90% sensitive
· Localization:
CT scan
MRI
MIBG , isotope scan

Managemant:
=Adrenalectomy
· Preoperative management
· Operative management
· Post operative management

Can't stop hormone abruptly

You should control HTN

إنّ المُؤمن العَارِف باللّه حقًا لا يزَال يطلُب مِن اللّهَ حاجته، ولو كانت السُنن الطَبيعية كُلها تُعبر عن استِحالة الوقُوع!
-د. فريد الأنصاري -رحمه الله