DISCLOSURES

• Speaker bureau for:
  NovoNordisk
  Sanofi
  BI-Lilly
  Abbott
  Janssen
  Merck (previously)
  BMS (previously)
PITUITARY

-Anterior
  - Thyroid Stimulating Hormone (TSH)
  - Prolactin (PRL)
  - Growth Hormone (GH)
  - Corticotropin (ACTH)
  - Luteinizing Hormone (LH)
  - Follicle Stimulating Hormone (FSH)

-Posterior (hormones made in the hypothalamus and stored in pituitary)
  - Vasopressin
  - Oxytocin
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PITUITARY TUMORS

- Tumors—usually benign adenomas
  - Common tumors, 70-80% are functional
  - Microadenoma:<1cm; macroadenoma:1+ cm
  - can cause
    - bitemporal hemianopsia
    - hypopituitarism
    - headaches
    - amenorrhea
    - galactorrhoea
    - growth/puberty delay
    - infertility
    - decreased libido/erectile dysfunction
PITUTARY TUMORS

- If suspected or being followed, order MRI of head attn: sella with and without contrast.

All pituitary tumors require testing for hormonal hyper-secretion and pituitary insufficiency. Visual fields must be checked if tumor is large and follow-up MRI obtained. Surgery usually recommended if visual field defects or significant growth of a large tumor.
NON-SECRETORY PITUITARY TUMORS

• Non-secretory tumors
  - Can be incidental microadenomas.
  - Can be large and might cause partial or full hypopituitarism and visual field defects. Symptoms of pituitary insufficiency might be minimal or absent, until the patient is under stress, when severe adrenal insufficiency might occur.
- Prolactinoma
  - galactorrhea, infertility, amenorrhea, decreased libido
    (note: prolactin elevation is generally proportional to size of tumor)
  - Treatment
    Cabergoline (Dostinex) twice weekly;
    Bromocriptine (Parlodel) nightly;
    rarely surgery
PROLACTIN ELEVATION

- Other Causes of mildly elevated prolactin
  - Dopamine antagonists
    - metoclopramide
    - many anti-psychotics (haldol, risperidone)
  - pituitary stalk compression from pituitary macroadenomas or non-pituitary tumors
  - Nipple stimulation
ACROMEGALY

-Acromegaly: growth hormone excess

- Signs/Symptoms: doughy and large hands, increasing hand and foot size, large tongue, frontal bossing, prominent chin, increased cardiovascular mortality
- Lab: high IGF-1 level (and GH level); might have deficits of other pituitary hormones
ACROMEGALY

• Generally a large pituitary tumor

  – TREATMENT
    Surgery; possibly octreotide or pegvisomant; possibly radiation therapy
TSH secreting tumor

TSH secreting tumor - rare

- elevated TSH and free T4

(note: in a patient with chronic poorly treated hypothyroidism, there might be significant pituitary thyrotroph hyperplasia noted on MRI. However, the TSH in this case will be high and the free T4 usually very low and the thyrotroph hyperplasia often resolves with adequate thyroxine treatment)
CUSHING’S DISEASE

-Cushing's Disease-ACTH secretion
  - obesity, striae, ecchymoses, hyperglycemia, atherosclerosis, thin skin, fatigue, fat pads (espec. supraclavicular), hyperpigmentation, infections
  - Diagnosis
    1. 24 hour urine free cortisol.
    1. dexamethasone suppression test
    1. Salivary cortisol between 11 pm and midnight
  - Treatment
    1. surgery, radiation
Dexamethasone suppression testing

- Low dose overnight:
  1 mg dexamethasone at 11 pm. Fasting cortisol the next AM at 8AM. Normal result is suppression of cortisol to <2-3 mcg/dl.

If abnormal, indicates possibility of cortisol excess and further testing is needed.

Note: obtaining a baseline ACTH level (without suppression) at some point might be helpful in patients who end up having abnormal low dose suppression testing. This can help us differentiate ACTH dependent vs. ACTH independent Cushings.
Dexamethasone suppression testing

- High dose overnight suppression testing:
  Obtain baseline cortisol level and ACTH.
  Give 8 mg dexamethasone at 11 pm that night.
  Fasting cortisol level the next AM at 8 AM.

Normal is a >50% reduction in cortisol.
Dexamethasone suppression testing

- INTERPRETATION

Adrenal Cushings syndrome: failure to suppress cortisol with low dose dexamethasone testing and low ACTH level at baseline. Usually don’t need high dose dexamethasone test.
Dexamethasone suppression testing

• INTERPRETATION

Pituitary Cushing’s disease: failure to suppress cortisol with low dose dexamethasone test. Adequate suppression with high dose dexamethasone test generally.

Elevated or normal ACTH level at baseline.
Dexamethasone suppression testing

• INTERPRETATION

Ectopic ACTH:

Failure to suppress cortisol with low dose and high dose dexamethasone suppression.

High baseline ACTH level.
Often metabolic alkalosis.
Hyperkalemia.
EMPTY SELLA

Fairly common.

Often asymptomatic but can have partial or pan-hypopituitarism.

Might be due to invagination of CSF into the sella, compressing the sella; pituitary infarction; etc.
Sellar extension of non-pituitary tumors

- Sellar extension of non-pituitary tumors
  - might cause elevated prolactin;
  - Might cause diabetes insipidus by stalk compression;
  - might cause visual field defects;
  - might cause pituitary insufficiency.
DIABETES INSIPIDUS

- loss of vasopressin secretion (central DI)
- Complete or Partial DI
- Inability to concentrate urine
- Hypernatremia, dehydration, elevated serum osmolality (note: some patients with partial DI and intact thirst mechanisms can drink enough fluid to maintain normal sodium levels)
- urine osmolality less than 290 with elevated serum osmolality
- Generally have frequent urination
DIABETES INSIPIDUS

- Diabetes Insipidus (cont)
  - Treatment
    - Replete fluids to correct serum sodium
    - DDAVP (desmopressin) - IV, SQ, Nasal spray, oral: initiate when sodium level is rising or in the 140 range or higher.

Note: treatment with DDAVP might be needed based on hypernatremia and/or to improve urinary frequency; fluid intake will have to be adjusted based on the effect of the DDAVP
DIABETES INSIPIDUS

• Must adjust the fluid intake and DDAVP together to avoid excessive fluid retention from DDAVP, especially in a head trauma patient with cerebral edema. Also important in a patient with lack of thirst mechanism.

• The maintenance dose of DDAVP will likely depend on the sodium level and convenience of frequency of urination and amount of fluid a patient can take in.
OTHER PITUITARY ISSUES

Head irradiation
  - can cause hypopituitarism years later
-Sheehan's Syndrome
  - post-partum pituitary necrosis
-Hemorrhage
-Hypothalamic Dysfunction
-Infiltrative Disease
-Autoimmune hypophysitis
HYPOPITUITARISM

- Hypopituitarism
  - Flu-like symptoms
    - Urgent diagnosis
    - Glucocorticoid replacement (Hydrocortisone 10-20 mg in am and 5-10 mg in pm with food, prednisone 5-7.5 mg daily, or equivalent)
    - Consider testosterone/estrogen
    - thyroxine (TSH level not useful)
    - might need DDAVP, growth hormone
HYPOPITUITARISM

- HYPOPITUITARISM
  Dx:
  - Symptoms (flu-like: nausea, dizziness, achiness, etc.)
  - Low FSH in post-menopausal woman not on estrogen
  - Low total and free testosterone and LH
  - Low sodium possibly
    - Possibly low morning cortisol (not a sensitive test) or and abnormal ACTH stimulation test (unless it is recent pituitary insufficiency)
  - Low TSH and low free T4; or low free T4 and inappropriately normal TSH.
CASE 1

CASE 1

- Sheehan syndrome.

  She likely had a pituitary adenoma (possibly a prolactinoma, which grew during pregnancy and infarcted when she became hypotensive during delivery)
CASE 2

- 60 year old centrally obese patient, 80 pound weight increase in one year. Type 2 diabetes mellitus for 3 years. Tanned skin. Leg weakness. Violaceous new stretch marks.
CASE 2

- Type 2 diabetes mellitus versus Cushing syndrome. Obtain overnight 1 mg dexamethasone suppression test and/or 24 hour urine free cortisol (and/or midnight salivary cortisol)
CASE 3

CASE 3

Needs DDAVP since has DI and sodium level is high.

Notes:

IV fluids can cause polyuria as can post-operative diuresis.
Dexamethasone can exacerbate diabetes insipidus.
What if this patient’s sodium level was 135? Then wouldn’t give DDAVP since this would cause fluid retention and hyponatremia. Adjust fluids to urine output and hold off on DDAVP until sodium level is perhaps in the low 140’s, then can start DDAVP. Adjust fluids and DDAVP to prevent fluid overload and to maintain serum sodium level in the normal range. This patient might not even have DI.
PITUITARY

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