Doctors notes, extra notes for explanation

Diseases of pituitary gland

1. Anterior pituitary adenoma:
   - Most common pituitary tumor
   - Can be functional (hormone-producing) or non-functional (non-hormone producing)
   - Classified based on size:
     A. microadenoma: if less than or equal to 1 cm (≤1cm)
     B. macroadenoma: if more than 1 cm (>1cm)
   - large non-functional adenoma causes hypopituitarism (we said that non-functional is non-hormone producing so the pituitary gland will fail to produce one hormone or more hormones, or it will not produce enough hormones)
   - may cause symptoms related to mass effect (mass effect is the effect of growing mass that pushes on surrounding tissue or structures in the brain):
     A. increased intracranial pressure
     B. optic nerve compression
     C. hydrocephalus (a condition in which there is an accumulation of cerebrospinal fluid within the brain)
   - histologic morphology: monomorphic appearance, does not correlate with functional status (functional status could be increased, decreased or not affected)

2. Lactotroph adenoma (prolactinoma):
   - A lactotropic cell is a cell in the anterior pituitary which produces prolactin.
   - The most common functioning pituitary adenoma (30%)
   - Dystrophic calcification is common (pituitary stones) (dystrophic calcification is the calcification occurring in degenerated or necrotic tissue and it occurs as a reaction to tissue damage)
   - Causes:
     A. Amenorrhea: absence of menstruation (no period)
     B. Galactorrhea: breast engorged with milk (milky nipple discharge unrelated to the normal milk production of breast-feeding)
     C. Infertility: inability to reproduce (sex-hormones related)
     D. loss of libido: low sex drive (sex-hormones related)
   - Symptoms are less obvious in men and post-menopausal women (more chance to reach large size)
   - Diagnosis: very high level of serum prolactin
   - High prolactin causes some cardiovascular diseases such as:
     A. endothelial dysfunction
     B. insulin resistance
   - increased level of prolactin is caused by:
     A. decreased clearance of prolactin due to chronic renal failure
     B. high TRH (thyrotropin releasing hormone) (which stimulates the release of TSH (thyroid stimulating hormone) and prolactin from anterior pituitary) increases prolactin secretion due to primary hypothyroidism.

C. drugs (anti-depressants) blocking dopamine receptors at hypothalamic junction (dopamine is the major prolactin inhibiting factor, so by bocking dopamine receptors we are blocking the effect of dopamine to inhibit further release of prolactin, which leads to an elevated level of prolactin).

- Mild increase in serum prolactin may accompany other types of pituitary adenoma or hypothalamic diseases due to interference with the normal inhibitory control of dopamine (normal effect of dopamine: inhibition, if this control is affected: increased levels of prolactin in blood) (dopamine is a hypothalamic hormone which inhibits prolactin release) causing lactotroph hyperplasia (lactotroph hyperplasia means an increase in the number of lactrotropic cells which leads to higher release of prolactin).

3. SOMATOTROPH ADENOMA (Growth-hormone secreting adenoma)
   - A somatotropic cell is a cell in the anterior pituitary which releases somatotropin = growth hormone.
   - Second most common functional PA (pituitary adenoma), non-functional SA (somatotroph adenoma) is rare
   - Commonly reach large size
   - Elevated levels of somatotropin causes:
     A. In children: gigantism (excessive growth and height to due increased growth and elongation in long bones)
     B. In adults: acromegaly (excessive growth in certain parts of the body (skin, soft tissue, viscera) causing enlargement in them)
     (gigantism and acromegaly are two disorders with the same disease mechanism, the difference is the age of onset, Gigantism occurs in childhood before the fusion of the long bone epiphysis characterized by tall stature, while acromegaly occurs in adulthood after the fusion of the epiphysis and is characterized by large extremities and face)
     C. Diabetes
     D. Hypertension
     E. GI cancer,
     F. gonadal dysfunction
   - May accompany lactrotroph adenoma (mammosomatotroph)
   - Microscopy:
     A. Densely granulated variants
     B. sparsely granulated variants
     (the latter is more aggressive and non-responsive to somatostatin (growth hormone-inhibiting hormone) therapy)

4. CORTICOTROPH ADENOMA
   - Corticotropes are cells in the anterior pituitary that produce pro-opiomelanocortin which undergoes cleavage to adrenocorticotropin (ACTH), β-lipotropin, and melanocyte-stimulating hormone
   - Functional adenomas produces ACTH causing hypersecretion of adrenal cortisol causing Cushing Disease
   - Commonly microadenoma (size ≤1cm)

- Variants:
  A. Densely granulated
  B. sparsely granulated
  C. Crooke cell adenoma: showing ring-like cytokeratin protein inside the cells, clinically aggressive
- Proopiomelanocortin (POMC): precursor of ACTH, stains positive for PAS stain
- Syndromes related to abnormal levels of cortisol:
  A. elevated level of cortisol -> Cushing syndrome, causes:
     - central obesity: distribution of fat in the abdomen and back
     - hypertension
     - hyperglycemia -> diabetes
  B. depleted level of cortisol -> Nelson syndrome: secondary to bilateral adrenalectomy, progressive enlargement of PA (pituitary adenoma) causing:
     - tumor effect
     - skin hyperpigmentation (Hyperpigmentation is the darkening of an area of skin caused by increased melanin) (The production of melanin is regulated by α-melanocyte-stimulating hormone (α-MSH) = melanotropin, which is produced from proopiomelanocortin (POMC))

5. GONADOTROPH ADENOMA
   - Gonadotropic cells are cells in the anterior pituitary that produce the gonadotropins, such as the follicle-stimulating hormone (FSH) and luteinizing hormone (LH).
   - Usually produces small amounts LH and FSH hormones (silent) (silent: lack of symptoms / insignificant symptoms)
   - Most symptoms are related to mass-effect or hypopituitarism (impaired secretion of LH which causes: loss of libido and amenorrhea)
   - Rarely secrete large amount of LH/FSH, which causes: macroorchidism (abnormally large testes), hyperspermia (production of a larger than normal volume of semen), ovarian hyperstimulation

6. THYROTROPH ADENOMA (TSH-producing adenoma)
   - Thyrotropes are cells in the anterior pituitary which produce thyroid stimulating hormone
   - uncommon (<1% of pituitary adenomas)
   - Rare causes of hyperthyroidism (Hyperthyroidism occurs when the thyroid gland overproduces thyroxine)
     A. PLURIHORMONAL ADENOMA:
        - Secrete multiple hormones
        - clinically aggressive
     B. NULL CELL ADENOMA:
        - Do not express any markers of hormones
        - not differentiated
7. PITUITARY APOPLEXY: (bleeding into or impaired blood supply of the pituitary gland)
   - Rare condition that complicates pituitary adenoma
   - Sudden hemorrhage in pituitary gland causing acute enlargement and damage

- Causes:
  A. Symptoms of increased intracranial pressure:
     - severe headache
     - nausea
     - vomiting
     - visual disturbance
  B. Symptoms of hypopituitarism (due to damaged cells in the pituitary gland)
  C. Loss of ACTH, causes:
     - depletion of cortisol level
     - Hypotension (accelerating) (fatal)
     - hypoglycemia (fatal)
- Critical condition needs neurosurgical intervention (we remove the blood)
- Sheehan syndrome: A similar but milder condition results from pituitary infarction secondary to ischemia (due to low levels of oxygen (through blood loss)), occurs in postpartum hemorrhage

8. PITUITARY CARCINOMA:
   - Rare, <1% of pituitary tumors
   - Most are functional (prolactin or ACTH-secretion is most common)
   - Differentiated from PA by metastasis (histologically very similar to adenoma but can be differentiated by metastasis)

9. PITUITARY BLASTOMA
   - Malignant pituitary tumor
   - arises in children <2 years
   - Morphologically undifferentiated cells (blastema) (A blastema is a mass of cells capable of growth and regeneration into organs or body parts).
   - Cushing syndrome is common

Diseases of posterior pituitary gland:

1. Diabetes Insipidus (DI):
   - Mimics diabetes mellitus DM with no hyperglycemia
   - Deficiency in anti-diuretic hormone (ADH), called "central DI" (ADH causes reabsorption of water which decreases urination) (Central diabetes insipidus (CDI) is a rare condition in which your body doesn't have enough antidiuretic hormone (ADH, or vasopressin), which causes you to pee large volumes of urine and become very thirsty).
   - Results in inability of kidneys to reabsorb fluids, which results in:
     A. Polyuria: excessive urination
     B. Polydipsia: excessive thirst or excess drinking
     C. Dehydration
   - Causes of DI:
     A. head trauma (including brain injury)
     B. hypothalamic diseases (tumors, inflammation)
     C. Can be genetic: mutation in arginine vasoprossin or its receptor

- Nephrogenic DI: kidney is unresponsive to ADH (similar symptoms)

2. SYNDROME OF INAPPROPRIATE ADH SECRETION (SIADH)
   - Inappropriate ADH secretion = excessive reabsorption of water more than minerals
   - Results in:
     A. over-reabsorption of water in kidneys, which causes:
        - Oliguria: low output of urine
        - Hyponatremia: low concentration of sodium in blood
        - cerebral edema: excess accumulation of fluid (edema) in the spaces of the brain
        - brain dysfunction
     B. total body fluid is increased
     C. blood volume remains normal
     D. no peripheral edema
   - causes:
     A. a paraneoplastic syndrome (small cell carcinoma of lung)
     B. drugs
     C. CNS inflammation
     D. Trauma
   - Treatment: removal of tumor

3. CRANIOPHARYNGIOMA: (CPh)
   - Cranio: inside the brain
   - We observe epithelial cells in the histological section of the brain
   - Suprasellar tumor (situated or rising above sella turcica), arises from the vestigial (remaining) epithelium of Rathke pouch (from pharynx in embryo)
   - Slowly growing tumor
   - Bimodal age distribution (children 5-15, old >65 years) (peak in children and peak in old adults)
   - Presentation: hypopituitarism (Dwarfism in children), DI, tumor effect (in adults) (no GH -> immaturity, retardation)
   - Adamantinomatous CPh: (adamantinoma: rare bone cancer)
     - squamous cell with keratin
     - also shows dystrophic calcification
     - may produce cyst or becomes inflammatory producing “machine oil” material
     - common in children
   - Papillary CPh:
     - squamous cells show papillae formation
     - no keratin
     - no cyst
     - no calcification seen in adult

Bissan Abo halaqa