**Summary**

**Pituitary Development**:

**• Posterior pituitary ( neurohypophysis):**

* from neural cells as an outpouching from the floor of 3rd ventricle
* Pituitary stalk joins the pituitary gland with hypothalamus

**• Anterior pituitary ( adenohypophysis ) :**

* From Rathke’s pouch, Ectodermal evagination of oropharynx .
* Migrate to join neurohypophysis

**Function of pituitary gland:**

**• Posterior pituitary:**

* **Oxytocin**
* **VASOPRESSION (ADH) = ↑secretionàSIADH , ↓secretion àDiabetes insipidus**

**• Anterior pituitary:**

* **Growth Hormone (GH)**
* **prolactin (PRL)**
* **Thyroid Stimulating Hormone (TSH)**
* **Luteinizing hormone (LH) and Follicle Stimulating Hormone (FSH).**
* **adrenocorticotrophic hormone (ACTH)**

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| --- | --- | --- | --- | --- | --- |
| Cell | Corticotroph | Gonadotroph | Thyrotroph | Lactotroph | Somatotroph |
| Hormone | POMC,ACTH |  FSH, LH |   TSH |  Prolactin |   GH |
| Stimulators | CRH, AVP, gp-130 cytokines | GnRH, Estrogen |  TRH | Estrogen, TRH | GHRH, GHS |
| Inhibitors | Glucocorticoids | Sex steroids, inhibin | T3, T4, Dopamine, Somatostatin, GH | Dopamine D2 receptor | Somatostatin, IGF1, Activins |
| Target Gland |  Adrenals |  Ovary, Testes |  Thyroid | Breast and other tissues | Liver, bone and other tissues |
| Trophic Effects | Steroid production =cortisol | Sex steroid, Follicular growth, Germ cell maturation | T4 synthesis and secretion | Milk production | IGF-1 production, Growth induction, Insulin antagonism |

 **DISORDERS OF PITUITARY FUNCTION**

* **Hypopituitarism**
* Central hypoadrenalism, hypogonadism, hypothyroidism or GH deficiency.
* Panhypopituitarism
* **Hypersecretion of Pituitary Hormones**
* Hyperprolactinemia
* Acromegaly
* Cushing’s Disease

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| Non-functional pituitary adenoma:* Absence of signs and symptoms of hormonal hypersecretion
* 25 % of pituitary tumor
* Needs evaluation either micro or macroadenoma (micro = less than 1cm , macro =more than 1 cm)
* Average age 50 – 55 yrs old, more in male
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| Presentation of NFPA | * As incidentaloma by imaging
* Symptoms of mass effect.
* Hypopituitarism
* Gonadal hypersecretion
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| Treatment | * Surgery if indicated
* Observation , in Slow growing tumour
* Adjunctive therapy
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| Functional Pituitary Adenoma |
| 1)Prolactin" | **Function:** stimulates breast development and milk production**Causes of Hyperprolactinemia:*** Hypothalamic Dopamine Deficiency
* Defective Transport Mechanisms
* Lactotroph Insensitivity to Dopamine
* Stimulation of Lactotrophs

**Prolactinomas :**Most common type of functional pituitary adenomas * Of women with prolactinomas- 90% present with microprolactinomas
* Of men with prolactinomas- up to 60% present with macroprolactinomas

**Clinical Features of Hyperprolactinemia/Prolactinoma:**Women: Secondary amenorrhea, infertility GlactorrheaMen: Loss of libido, Headache, Gynecomastia**So Not all hyperprolactinemia is due to a prolactinoma …****Management:*** Medical Medical Medical Medical therapy (the Dopamine agonist)
* Surgical resection
* Radiation therapy
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| 2)GH | * Pituitary tumor as mass effect →→ Growth hormone deficiency
* Hyperfunctioning mass →→ Acromegaly
* **Clinical presentation of GH deficiency:**

Children - growth delay Adult - hypoglycemia**Diagnosis**:* GH, IGF-I level
* Dynamic testing: clonidine stimulation test, glucagon stimulation, exercise testing, arginine-GHRH, insulin tolerance testing
* X-ray of hands: delayed bone age
* In Adult: Insulin tolerance testing, MRI pituitary to rule out pituitary adenoma

**Management**: GH replacement* **Clinical picture and presentation of Acromegaly:**
* GH level ( not-reliable, pulsatile)
* IGF-I
* 75 g OGTT tolerance test for GH suppression
* Fasting and random blood sugar, HbA1c
* Lipid profile
* Cardiac disease is a major cause of morbidity and mortality
* 50 % died before age of 50
* HTN in 40%
* LVH in 50%
* Diastolic dysfunction as an early sign of cardiomyopathy

**Medical treatment:*** Somatostatin analogue
* Surgical resection of the tumor
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| 3) ACTH | Function :regulate the steroid hormone cortisol. Cortisol is released by the adrenal gland.**HPA-axis*** 2nd adrenal insufficiency
* glucgocorticoid replacement
* Circadian rhythm of cortisol secretion
* Early morning cortisol between 8-9 am

**Hypoadrenalism:*** Nausea
* Vomiting
* Abdominal pain
* Diarrhoea
* Muscle ache
* Dizziness and weakness
* Tiredness
* Weight loss
* Hypotension

**Management of hypoadrenalism:*** **Cortisol replacement**
* **ACTH-Adenoma :**

**HPA-axis ( excessive cortisol)-** Cushing syndrome* 80 % HTN & LVH
* Diastolic dysfunction, intraventricular septal hypertrophy
* ECG needed: high QRS voltage, inverted T-wave
* Echocardiogram preop
* OSA: 33% mild, 18% severe. Needs respiratory assessment and careful use of sedative during surgery
* Glucose intolerance
* Osteoporosis with vertebral fracture
* thin skin→ difficult IV cannulation, poor wound healing

**Cushing’s-Management*** Surgical resection of pituitary
* Medical Treatment
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| 4)TSH  | FUNCTION: It tells the thyroid gland to make and release thyroid hormones. |
| * **Central Hypothyroidism**
* Low TSH
* Low free T4 and T3

**Management** :* Thyroxine replacement
* Surgical removal of pituitary adenoma if large
 | * **TSH-Producing adenoma**
* Very rare
* Signs of hyperthyroidism
* High TSH, FT4, FT3

**Treatment*** with anti-thyroid meds
* Surgical resection of adenoma
* Medical therapy: Somatostatin Analogue
 |
| 5)LH &FSH | * **Gonadotroph Adenoma**

• High FSH and Low LH • High serum free alpha subunit • High estradiol , thickened endometrium and polycystic ovaries**Treatment**:* Surgical resection if large
* Radiation therapy
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