SUMMARY

Pituitary gland

Pituitary gland is an exceedingly important ductless gland with a wide range of functions including the central of other ductless glands and of body growth. It is reddish grey ovoid body 12 x 8 mm. It is weight is about 0.5 gram, heavier in ♀ than ♂ , it is situated in the hypophyseal fossa of sphenoid bone. The hypophysis cerebri consists of an anterior and posterior lobe. The anterior lobe is derived from the ectoderm of the stomodeum, while posterior lobe is derived from the floor of the fore-brain. The unfundibulum which is directed downwards and forwards contains a funnel-shaped recess from the cavity of the third ventricle and is surrounded by an upward extension from the anterior lobe of the gland. The pituitary gland receives blood supply from the internal carotid anteries and the arterial circle.

Histologically the pituitary gland is subdivided into anterior lobe and posterior lobe. The anterior lobe consists of three parts pars distales, pars tuberales and pars intermedia, while posterior lobe consists of pars nervosa and infundibulum.

The anterior lobe consists of group of cells according to hormone which they secrete and the staining characteristics of each cell pars distalis consist of chromophil cell (48%) and chromophyobe cells about 52%.
The anterior lobe of pituitary gland secretes several tropic hormones:

1. Growth hormone (GH) which is necessary for the growth of many tissues particularly the skeleton. It has anabolic effect with nitrogen balance. It is secreted by eosinophilic cells.
2. Thyroid stimulating hormone (T.S.H.) which has two action on the thyroid gland: (a) Increase the vascularity and growth of thyroid gland. (b) Metabolic action by increasing the picking up of the thyroxine and triiodothronine.
3. Adrenocorticotrophic hormone (ACTH): stimulating the zona fasciculata and zona reticularis of the suprarenal gland stimulating the formation of the glycocorticoids and the adrenal sex hormone.
4. Gonadtrophic hormones:
   a- Follicle stimulating hormones (FSH).
   b- Lukeinishing hormone (LH) or interstitial cell stimulating hormones (ICSH) or chorionic G.T.
   c. Prolactin hormone (LTH).

Posterior lobe:

Its function is the store of two hormones which are manufactured by the hypothalmus particularly the supraoptic and paraventricular nuclei and these hormones are released when needed they are:-

a- Vasopressin or antidiuretic hormone (ADH) leads to water retention by acting on distal and collecting tubules of the kidney.

b- Oxytocin causes uterine contraction during labour and milk ejection when an infant is breast fed due to suckling reflex.

Pathology of pituitary gland. They pituitary tumours. These constitute about 10% of all intracramial tumours. The commonest form is the benign adenoma, carcinomas may accaure. The large number of pituitary Tumors are non-functioning chromophobe adenomas pituitary tumors are of special interest because of the important complications of their parasellar rextension and their dramatic syndrome of hormonal hypersecretion. Andenohypophysial tumours are customarly classified according to the characteristics of the secretory granules into chromophobe, acidophil and basophil types, although more than one cell

type may occur in an individual tumor. It is convenient also to include craniopharngiomas in a discussion of pituitary tumours despite their origin from cells unrelated to the pituitary. The clinical problems presented by these tumours resemble those of chromophobe adenomas.

Eosinophilic adenomas account for 10-14% of pituitary tumours sex and age and distribution does not differ. It is encapsulated slow growing and relatively good hormone procedures . The majority of STH producing pituitary tumours are composed of relatively sparsely granulated eosinophils and a granular cells. An excess of STH produces increased growth resulting in giguitism in children or acromegaly in adult.

Easophilic adenomas ACTH secreting. Most of ACTH secreting pituitary adenomas remains under hypothalamus influence and the target organ hormone in sufficient quantity will suppress the tumour.

ACTH secretion also can be suppressed in patients with bilateral adrenal hyperplasia and cushing's syndrome with or without a pituitary tumours and suppression tests will not separate these groups of patients.Cushing's

syndrome is due to anterior pituitary neoplasia in at least 10% of cases. About one half of these patients have evidence of the tumours before surgery Patients with cushing's syndrome of pituitary origin may have increased pigmintation a situation analogous to the cutaneous melanosis in Addison's disease.

Chromophobe adenomas: These are the most common type of pituitary tumours. Men and women are equal affected age , any age, but predominated in the third, fourth and fifth decades of life. These tumours lack large secretory granules but often contain sparse fine granulation with periodic acid scheff stain.

Other tumours such as TSH-secretory tumours, prolactin-secreting tumours and pluriglandular adenomasosis.

The craniophargyngioma: It is solid mass that undergoes cystic change proliferation of the superficial layers result in Keratinization formation of epithelial pearls and calcification. Craniopharygngiomas are well encapsulated. It shows histological pattern of an embryonal tooth and is most often topped by a fibreues cyst lined by squamous epithelial cells, it contain blood pigment and histocytes.

Posterior pituitary:

ADH, antidiaretic hormone (vasopressin) is an octapeptide synthesized in the paraventricular and supraoptic nuclei of the hypothalamus as a part of a polypeptide carriers portion (neurophysin D).This prohormone complex migrates to posterior pituitary where dissociation and simultaneous secretion of the neurophysin and ADH take place. ADH binds to receptors in the distal convoluted tubules and collecting ducts of the kidney. There , it stimulates the generation of cyclic AMP and enhances the permeability of the tubular epithelium to water.

ADH controlled by two factors: (1) plasma osmolality: above 285 mosm per liter (osmotic threshold) concentration of ADH . The regulation effect represented by a negative feed back mechanism.

(2) A 5% or greater decrease in plasma volume stimulates ADH release which results in free water retention in addition to:

Oxytocin : The synthesis of oxytocin as a part of a prohormone containing neurophysin II and its transport down the neurohypophyseal tract occur in a fashion analagous to that of vasopressin. A stimulus for its release

is suckling. The hormone acts on the myoepithelial cells of the breast to produce milk ejection.

Diagnostic pituitary studies:

Skull films should be obtained in patients whose signs and symptoms lead to the suspicion of pituitary disorder. Lateral films will demonstrate the sagittal profile of the sella turcica and anteroposterior films, properly taken, will demonstrate the floor of the sella, but only the posterior, anterior and inferior aspects on the pituitary can be evaluated by these films. Tomography provide a more certain assessment of the sella turcica and are especially helpful for the study of small microadenoma. The lateral aspect of the pituitary can be assessed only by angiography, and the superior aspect can be visualized only by pneumoencephalography. Since patients will often develop some degree of malaise following pneumoencephalography, angiograms usually are performed first. These radiological studies may be strssfull and patients with a disordered pituitary-adrenal axis should be protected with supplementary adrenal steroids during their radiographic studies.

Not all patients with enlargement of the sella turcica have pituitary tumours fully 10 percent of this

group have the empty sella turcica syndrome, in which pneumencephalography results in filling of the sella with air. The etiology of this syndrome is unclear. Should endocrine studies point to a hyper secreting tumours. The sella nonetheless should be explored as a moderate number of microadenomas have been removed from so called empty sellas.

Functional pituitary studies:

Increasingly endocrine studies of pituitary function are replacing anatomical studies in the diagnosis of hypersecretion tumours since patients with pituitary disorders may have hyperfunction of some cell populations and hypofunction of other cell populations, a full battery of assays is usually essential to understand the functional derangements caused by the tumours.

Therapeutic modalities:

Transcranial surgery:

Before the era of antibiotics surgeons were relactant to open the frontal sinus to reach the pituitary, the intracranial route was via a lateral subfrontal or

temporal approach. Antibiotics made it possible for surgeons to remove the frontal bone and if needed to open the frontal sinus without fear of meningitis. Working through the frontal sinus permits less retraction of frontal lobe and better exposure of the pituitary. Experienced surgeons can perform transfrontal pituitary surgery for hypophysectomy and for tumours with little morbidity or mortality. This approach allows the surgeon to visualize the anatomical variations that frequently surround the pituitary and to assay the distortions of the surrounding neural and vascular structures that result from tumour growth.

Transsphenoidal approaches:

The advantages of the transsphenoidal approaches to the pituitary were recognized. Yet the high incidence of infection in the preantibiotic era worked against this approach. After opening the frontal sinus during pituitary surgery was proved safe. The transnasal approach through the sphenoid sinus was again employed. Although this approach does not allow the surgeon to visualize intracranial anatomical variations or the

variable distortions that occur with large tumours. It is cosmetically superior since the incision is hidden in the gingival mucosa of the upper lip . Experience has verified that this approach to the pituitary is safe and in recent years it has supplanted the transfrontal intracranial approach in most clinics . This procedure demands an operative microscope and fluoroscopy.

Stereotaxic techniques:

Because the sella turcica is such a convenient radiographic target, the pituitay has been treated by a variety of sterotoxic techniques. Many of these techniques were developed for the purpose of hypophysectomy in the treatment of metastatic cancer,but in selected cases, the same techniques have been employed in the treatment of pituitary tumours . In most instances the cannula employed in stereotaxic pituitary surgery is introduced by the transsphenoidal or transethmoidal route. Radiographic control is essential, but these procedures can be performed under local anesthesia. Radioactive gold, radioactive Yttrium, cryosurgery

and radiofrequency generators have been employed with good success to destroy the normal pituitary and to treat certain pituitary tumours. A major problem with stereotaxic procedures has been the high incidence of cerebrospinal fluid rhinorrhea.