Pituitary Tumours:

Describe the epidemiology and clinical presentations of pituitary tumours:

- 10-15% of all primary brain tumours
- More common in females
- Unselected autopsy studies 20-25% of population have incidental silent pituitary adenoma
- Clinically occult microadenomas seen in 12% of MRI scans (incidentalomas)
- 3% of pituitary tumours occur in the contest of MEN-1 syndrome (autosome dominant).
- Hyperfunction: 70% of pituitary adenomas are active. Hypofunction : from compression of the normal gland by an adenoma
- Mass effect: visual symptoms, headaches, hydrocephalus, hypothalamic compression.
- Rarely extension into the cavernous sinus can cause ophthalmoplegia
- Seizures: irritation of mesial temporal lobe by a large adenoma

Describe the classifications of pituitary adenomas with respect to size and cell of origin:

Clinical classification:

A. Functional (PRL, GH, ACTH, Thyrotroph adenoma, gonadotroph adenoma, mammosomatotroph adenoma, alpha subunit secreting adenomas)

B. Non -functional (null cell adenoma)

Size:

A. Microadenoma :< than 10 mm in diameter

B.Macroadenoma :> than 10 mm in diameter

Pathological:

I. Staining affinity: poor correlation between staining features and hormonal activity

1. Acidophilic

2. Basophilic

3. Chromophobic (50% are active)

II. Immunohistochemistry and electron microscopy (14 types described) Kaye page 808

List investigations of patient presenting with pituitary region mass:

1. Establish an endocrine diagnosis (PRL, GH, IGF1, ACTH, cortisol, LH, FSH, T3, T4 TSH,)

2. Establish an anatomical diagnosis:

    A. CT: CT sinuses coronal (looking for bony anatomy, destruction of clivus etc…)

    B. MRI (more sensitive can identify 70% of microadenomas<3 mm). Dynamic MRI for functioning microadenomas

3. Occasionally extracranial imaging (Cushing's)

4. Petrosal sinus samples in difficult cases(hormone level twice the blood level and lateralisation

5. Visual acuity and formal visual fields

Describe pituitary/ hypothalamic emergencies including apoplexy, DI and Addisonian crisis:

- **Pathogenesis of pituitary apoplexy:**

Pituitary apoplexy is the acute catastrophic haemorrhagic necrosis of pituitary adenoma and gland. It complicates **1-2%** of pituitary adenomas and presents with headaches, vomiting, meningism, deterioration of vision and ophthalmoplegia. Subclinical haemorrhages into pituitary adenomas occur in **20% of cases**

Pathogenesis: Speculative and controversial

1. Ischemic necrosis of rapidly growing adenoma outgrowing its blood supply
2. Intrinsic vascular abnormalities of the adenoma vessels.
3. Compression of the superior hypophyseal artery at the edge of the diaphragma by expanding tumour leading to ischemia and necrosis
4. Invasion of the pituitary vessels by tumour cells - haemorrhage.

Predisposing factors: radiation, bromocriptine therapy, anticoagulation, head trauma, estrogens therapy, cardiac surgery, cough, sneezing, laparoscopic surgery and diabetic ketoacidosis

Chronologically Infarction of the tumour and gland—Haemorrhage---Oedema---increase of the tumour volume with compression of the optic apparatus and the cranial nerves in the cavernous sinus (III, IV.VI) ---Leakage of the blood into the subarachnoid space---with occasional obstruction of the third ventricle and hydrocephalus.-and Destruction of the gland – hypopituitarism.

Surgical emergency: 1. Hydrocortisone stress dose (100mg qid) 2. Surgical decompression via Transphenoidal approach 3. Hormone replacement

- **Diabetes insipidus:** transient DI develops in 20-33% and permanent DI in 3-5% of patients after transphenoidal surgery. Initial treatment is with fluid replacement guided by thirst (in a wake patient with intact hypothalamus). If symptoms persist use DDAVP 2-4 micrograms as needed.

ADH is synthetised in the hypothalamus (supraoptic and paraventricular nuclei and transmitted to posterior lobe of pituitary gland via pituitary stalk)
Diabetes insipidus is caused by deficiency in secretion of ADH/Vasopressin (neurogenic) of failure to response the ADH due to distal tubular pathology (nephrogenic).
Causes of neurogenic DI is most commonly associated with pituitary surgery (20% transient and 5% permanent), other causes include surgery for parasellar lesions (meningioma, dermoids), hypothalamic tumours (gliomas) Histiocytosis, head injury with avulsion of pituitary stalk.
Clinical manifestations; polyuria (> 1l in 4 hours), polydipsia (can be absent in hypothalamic pathology), s. osmolarity> 300, Na > 140, low urine osmolarity 50-200 and fall in body water > 5%.
Treatment: If the patient is conscious initial treatment is water replacement guided by thirst and blood tests. If it does not resolve in few hours s/c or intranasal Desmopressin (0.5-2 micrograms) repeated as necessary .Get endocrine consult.

Addisonian crises (Greenberg -12**):** develops in patients with pituitary and adrenal insufficiency and is caused by stressful condition (sepsis, trauma, surgery etc...). Characterised by hypotension, shock, hyponatremia, hyperkalemia, hypoglycemia and hypo or hyperthermia.

Treatment: replacement of glucocorticoids at stress dose (100mg qid) and replacement of mineralocorticoids (fludrocortisone) 0.05-0.2 mg qid.

Perform a full endocrinological assessment and demonstrate the medical management of common endocrinopathies:

History: tiredness, cold intolerance, weight gain, depression, sexual function, menstrual function, fertility.

O/E: moon face, central obesity, buffalo hump, purple stria, prognathism, coarse facial features, frontal bossing, (acromegalic features). Myxoedema, thyroid lump, eye signs (exophthalmos, ophthalmoplegia) etc…

Treatment: depends on the cause: for example

1. hypothyroidism: thyroxine 50-100 micrograms /day

2. Hyperthyroidism : surgery, radioactive iodine

Describe the postoperative care of patient who has had pituitary region surgery:

1. Analgesia
2. Strict fluid balance. If urine output more than 1 l/ 4 hours inform registrar. Initially treated with fluid replacement (check. Na, osmolarity, urine osmolarity and specific gravity) and if it does not settle give DDAVP. Transient DI develops in 22-33% and permanent DI in 3-5%.
3. Look for CSF rhinorrhea which complicates 5-10% of transphenoidal surgery: treatment include lumbar drain and nurse head up, if no improvement in 24 hours consider exploration (fat or fascia graft and fibrin glue)
4. Neuroobseravtion
5. Visual assessment: postoperative visual deterioration can be due to haematoma, direct injury, ischemia or fractures of the base of skull from the speculum. If the patient is found in the recovery to be blind the patient should be taken to theatre, explored for drainage intrasellar haematoma. If no haematoma found do urgent CT scan to look for correctable cause.

Discuss the management of CSF leak following pituitary surgery:

Intraoperative:

Cerebrospinal fluid leakage is noted at the time of transsphenoidal surgery following resection of the pituitary tumour as the arachnoid descends to fill in the sometimes very large space around the pituitary tumour now empty of tumour mass.

Immediate post operative:

Cerebrospinal fluid leak is sometimes recognized immediately post operatively when the patient begins complaining of a salty taste. Most patients have nasal packing in for a few days and until this comes out it may help mask a CSF leak.

Delayed post operative:

Cerebrospinal fluid leak following transsphenoidal surgery may not be evident until after the nasal packs removed and the patient sent home. Sometimes it is recognized by a salty taste, in other by dripping of clear fluid from one or both nostril(s) -- usually can be provoked and worsened by having the patient flex the head forward.

Delayed:

Occasionally cerebrospinal fluid leak following transsphenoidal surgery is apparent only weeks or months after surgery. In these cases there is often a defect in the arachnoid that enlarges slowly with time.

I. If the leak is discovered intraoperatively. The sellar flor should be patched with fat, muscle or facial graft and fibrin glue. Lumbar drain is inserted for few days. The use of prophylactic antibiotics is controversial. Patients should be observed for signs of meningitis and treated accordingly. If the leak does not stop the patient should be explored and a second attempt at patching the defect, fibrin glue and reconstruction of the sellar floor (bone).

II. If the diagnosis is made postoperatively, ELD is inserted and patient kept in bed 30 degrees head up for few days. If leak continues, patient should be explored as above. ENT consult and endoscopic assisted identification of the leaking point may be useful.

Describe primary and secondary empty sella syndrome: Greenberg -474

- idiopathic (primary)
  - Most commonly reported in middle-aged obese women (a/w DM, HTN, normal pituitary function). Predisposing factors include BIH.
- secondary
  - pituitary adenoma surgery
  - surgery or irradiation
  - communicating hydrocephalus
- familial (very rare)

X-ray findings:

- sella normal or increased
- intrasellar herniation of subarachnoid space

• Symptoms:

- headache, visual disorders
- +/- decreased pituitary function: clinically evident pituitary dysfunction is rare.
- CSF rhinorrhea

Discuss the gross and microscopic features of pituitary region tumours:

1. Pituitary adenomas: grossly are yellow grey to purple in colour and often have soft, fluid or creamy texture. Histologically these tumours are composed of uniform cells (cellular monomorphism) and lack the acinar organisation of normal gland. In contrast normal gland is composed different cell types in a well organised acinar pattern.

2. Craniopharyngioma : as above

3. Meningioma : look above