Pituitary for the General Practitioner

Marilyn Lee
Consultant physician and endocrinologist
Pituitary tumours

- Anterior/posterior pituitary
- Extension of adenoma upwards/downwards/sideways
- Producing too much of 1 or more hormones
- Compressing the pituitary gland making it produce too little of 1 or more hormones
Pituitary tumours

- Anterior/posterior pituitary
- Extension of adenoma upwards/downwards/sideways
- Producing too much of 1 or more hormones
- Compressing the pituitary gland making it produce too little of 1 or more hormones
Pituitary tumours

- Anterior/posterior pituitary
- Extension of adenoma upwards/downwards/sideways
- Producing too much of 1 or more hormones
- Compressing the pituitary gland making it produce too little of 1 or more hormones
Negative feedback
Neurosecretory cells produce releasing and release-inhibiting hormones. These hormones are secreted into a portal system. Each type of hypothalamic hormone either stimulates or inhibits production and secretion of an anterior pituitary hormone. The anterior pituitary secretes its hormones into the bloodstream.

These hormones move down axons to axon endings. When appropriate, ADH and oxytocin are secreted from axon endings into the bloodstream.

Antidiuretic hormone (ADH) is secreted by the posterior pituitary, which influences the kidney tubules to reabsorb water. Oxytocin, also from the posterior pituitary, stimulates contraction of smooth muscle in the uterus.

The anterior pituitary is divided into two main sections: the adenohypophysis and the neurohypophysis. The adenohypophysis secretes hormones that control other endocrine glands, such as the thyroid, adrenal cortex, reproductive organs, and the mammary glands. The neurohypophysis produces ADH and oxytocin directly into the bloodstream.

- **Gonadotropins (FSH & LH)**: Affects reproductive organs (ovaries, testes).
- **Growth hormone (GH)**: Affects bones, tissues.
- **Prolactin (PRL)**: Affects mammary glands.
- **Adrenocorticotropic hormone (ACTH)**: Affects adrenal cortex.
- **Thyroid stimulating hormone (TSH)**: Affects thyroid.
- **Oxytocin**: Smooth muscle in uterus.
Pituitary hyperfunction

- Excess production of adenohypophyseal hormones
- Order of frequency: Prolactin → GH → ACTH → gonadotrophin → TSH

- Prolactin excess → hyperprolactinemia
- GH excess → acromegaly/gigantism
- ACTH excess → Cushing’s disease
- TSH excess → secondary hyperthyroidism
- Gonadotrophin excess → reproductive dysfunction

- SCREEN → CONFIRM → LOCALIZE
Pituitary tumours

- Anterior/posterior pituitary
- Extension of adenoma upwards/downwards/sideways
- Producing too much of 1 or more hormones
- Compressing the pituitary gland making it produce too little of 1 or more hormones
Hypopituitarism

• Single or several hormone deficiencies
• Congenital or acquired
• Acute (emergency) or chronic
Causes

• Congenital
• Neoplastic (pituitary adenoma, peripituitary tumours)
• Vascular (Sheehan’s, apoplexy)
• Inflammatory/infiltrative (sarcoidosis, lymphocytic hypophysitis)
• Infective (TB, syphilis, mycoses)
• Post-irradiation (pituitary, nasopharyngeal, cranial)
• Miscellaneous (empty sella, TBI)
General rules in hypopituitarism

• Partial hypopituitarism is more frequent than panhypopituitarism

• Symptoms and signs do not manifest until over 75% of the anterior lobe is destroyed

• Hormones mandatory for survival are the last to go
• Classically develops in a sequential order with GH being affected first, then gonadotrophins, followed by TSH and ACTH
<table>
<thead>
<tr>
<th>Deficient hormone</th>
<th>Symptoms</th>
</tr>
</thead>
</table>
| GH                | Children: growth retardation  
 Adults: Excessive tiredness, muscle weakness, lack of drive, impaired QoL scores |
| FSH/LH            | Men: reduced facial and body hair, low libido, impotence  
 Women: amenorrhoea, reduced libido, dyspareunia and hot flushes |
| TSH               | Weight gain, decreased energy, sensitivity to cold, constipation, dry skin |
| ACTH              | Pale appearance, weight loss, low bp, dizziness, tiredness, ‘collapse’ during intercurrent illness |
| AVP/ADH           | Thirst, polyuria and nocturia |
Hormone replacement therapy

- ACTH
  - Hydrocortisone (average 20mg/day in 2-3 divided doses)
  - Sick day rules
- TSH
  - Thyroxine
  - Make sure steroids replaced first
- FSH/LH
  - HRT (oral/patch)
  - Testosterone (im/gel)
  - Pregnancy implications
• GH
  • Daily sc injection
  • Required in children
  • Adults with biochemical GHD and exhibit excessive tiredness, muscle weakness, weight gain, anxiety and depression may benefit

• AVP (ADH)
  • DDAVP tablets/nasal spray
Secondary thyroid dysfunction
Secondary thyroid dysfunction

- Secondary hyperthyroidism
  - FT4 high, TSH normal or high
- Secondary hypothyroidism
  - FT4 low, TSH normal or low
• 72/C/F
• c/o chronic fatigue, dry skin, constipation
• FT4 9 pM (12.6-21.0)
• TSH 5.4 mIU/L (0.51-4.3)
• 55/C/M
• Previous transphenoidal surgery for non-functioning pituitary adenoma
• Panhypopituitarism on hydrocortisone, thyroxine and testosterone
• FT4 15.6 pM (12.6-21.0)
• TSH 0.17 mIU/L (0.51-4.3)
Important principles

• Log linear relationship between FT4 and TSH.

• Just monitor FT4 if patient has panhypopituitarism. TSH will be low.

• Screen other pituitary hormones.

• Beware of replacing thyroxine in the presence of untreated hypocortisolism.
Acromegaly
Acromegaly

- Incidence: 4-6 new cases per million per year
- Prevalence: 60 per million
- Most often occurs in adults aged 30-50.
- Presentation before growing ends of bones have fused is very rare.
- Result of GH hypersecretion from a pituitary adenoma and the actions are mediated by IGF-1.
- GH levels fluctuate throughout the day but IGF-1 levels don’t
Acromegaly

- Main features:
  - Coarsening of facial features
  - Enlarged hands and feet
  - Carpal tunnel syndrome
  - Excessive sweating and oily skin
  - Headaches
  - Vision disturbance
  - Sleep apnoea
  - General tiredness
Acromegaly

- Investigations
  - GH/IGF-1
  - OGTT
  - MRI scan
- Treatment possibilities
  - TSS
  - Medical therapy
Cushing’s disease
Cushing’s disease

- Incidence: 5-6 new cases per million per year
- ACTH secreting pituitary adenoma
- Cushing’s syndrome
  - Think about exogenous steroids
Cushing’s disease

• Presenting symptoms
  • Easy bruising
  • Facial plethora
  • Proximal myopathy
  • Striae
  • Thin skin
  • Rounded facies
  • Weight gain- central obesity
  • Muscle wasting and proximal myopathy
  • Hirsutism
  • Hypertension
  • Diabetes
  • Osteoporosis and fractures
  • Psychiatric disturbances
  • Menstrual irregularities
Cushing’s disease

• Investigation
  • ONDST
  • 24 hour UFC

• Treatment
  • TSS
  • Radiotherapy
  • Adrenalectomy
  • Medical therapy
Cushing’s disease

• Long term follow up required

• Pituitary hormone replacement therapy may be required after surgery

• Steroid sick day advice should be given
Hyperprolactinemia
Hyperprolactinemia

- Pregnancy and lactation
- Drugs
- Also seen in Cushing’s syndrome, primary hypothyroidism and PCOS

- Most common hypothalamic-pituitary dysfunction
- Prolactinoma is the most common pathological cause
- Beware of lab pitfalls (macroprolactinemia, hook effect)
Presenting symptoms

- Galactorrhoea
- Oligo/amenorrhoea
- Infertility
- Reduced libido
- Erectile dysfunction
- Gynecomastia
- Pressure effects
Investigations

- Exclude pregnancy
- Careful drug history
- TFT, PRL
- MRI pituitary

- Only pituitary tumour that responds to medical therapy
## When to refer?

<table>
<thead>
<tr>
<th>Main symptom</th>
<th>Associated with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oligo/amenorrhoea</td>
<td>Hyperprolactinemia, hypogonadism</td>
</tr>
<tr>
<td>Reduced libido in men and women, reduced potency in men</td>
<td>Hyperprolactinemia, hypogonadism</td>
</tr>
<tr>
<td>Coarsening of facial features, enlarged hands/feet</td>
<td>Acromegaly</td>
</tr>
<tr>
<td>Central weight gain, thin skin, violaceous striae</td>
<td>Cushing’s</td>
</tr>
<tr>
<td>Diabetes, hypertension in the young and suggestive features</td>
<td>Acromegaly, Cushing’s</td>
</tr>
<tr>
<td>Osteoporosis and fractures (in the young, in men)</td>
<td>Cushing’s</td>
</tr>
<tr>
<td>Pale, weight loss, low Bp, giddiness, tiredness</td>
<td>Hypopituitarism</td>
</tr>
<tr>
<td>Abnormal TFTs that don’t fit a typical pattern of primary thyroid dysfunction</td>
<td></td>
</tr>
</tbody>
</table>
References

- Pituitary disease fact file. The Pituitary Foundation
Pituitary Disease Factfile

The Pituitary Foundation Information Booklets

Working to support pituitary patients, their carers & families.