Premature Sexual Development

‘Development of secondary sexual characteristics before aged 8 years in females and 9 years in males’

Due to:
- a) **Precocious puberty** – when accompanied by a growth spurt.
- b) Premature breast development (**thelarche**).
- c) Premature pubic hair development (**adrenarche**).

**Puberty**

‘The period when secondary sexual characteristics begins to develop and the potential for sexual reproduction is reached’

Hypothalamic **gonadotrophins releasing hormone (GnRH)** pulse remains dormant throughout early childhood.

From age of 8 gradual ↑ of pulses GnRH (most pulses occur during sleep).

Leading to LH and FSH secretion.

(Leptin may be responsible for kick starting puberty).

**Females**
- LH stimulations onset of **menstruation** (must have a BMI of 47kg).

**Males**
- LH stimulates release of **testosterone from Leydig cells** and onset of **spermatogenesis**.
- Dihydrotestosterone stimulates **secondary sexual characteristics**.
**Precocious Puberty**

Categorised according to levels of pituitary-derived gonadotrophins (LH and FSH):

**Gonadotrophin-dependant**

a. ‘True’ PP
b. \( \uparrow \text{LH} > \uparrow \text{FSH} \)
c. Caused by: premature activation of the hypothalamic-pituitary-gonadal axis.

**Gonadotrophin-independent:**

a. ‘False’ PP
b. \( \downarrow \text{FSH} \downarrow \text{LH} \)
c. Caused by: excess sex steroids

**Causes**

**Gonadotrophin-dependant**

i. Idiopathic / familial.
ii. CNS abnormalities
   - Congenital anomalies e.g. hydrocephalus.
   - Acquired e.g. post-irradiation, infection, surgery.
   - Tumours e.g. microscopic haemartomas.
iii. Hypothyroidism.

**Gonadotrophin-independent**

i. Adrenal disorders
   - Tumour.
   - Congenital.
   - Adrenal hyperplasia.
ii. Ovarian – Tumour (granulosa cell).
iii. Testicular – Tumour (Leydig cell).
iv. Exogenous sex steroids.
PP in Females

Usually idiopathic of familial – Follows normal sequence of puberty.

Organic causes (rare) – Associated with:
   Dissonance when the sequence of pubertal changes is abnormal
   e.g. isolated pubic hair with virilisation of the genitalia.
   Rapid onset.
   Neurological S&S e.g. neurofibromatosis.

Investigations

Ultrasound of ovaries and uterus
In premature onset of puberty: multicystic ovaries and enlarging uterus.

PP in Males (uncommon)

Usually has an organic cause.

Examine testes for:
   1. Bilateral enlargement – Suggesting gonadotrophin release, usually from
       intracranial lesion.
   2. Unilateral enlargement – Suggests gonadal tumour.

Investigations

Investigate for tumour – Cranial MRI scan.

Management (M&F)

Detect and treat any underlying pathology.
Address psychological/ behavioural difficulties.

Female:
   If GD – GnRH analogues (do not always treat).
   If GI – Identify source of excess steroids – Inhibit androgen or oestrogen
   production or action e.g. with medroxyprogesterone acetate.
**Premature Breast Development (thelarche)**

Usually affects females between 6mths and 2years.

Enlargement may be asymmetrical

**Differs from PP:**
Absence of axillary/ pubic hair development.
Absence of growth spurt.
Self-limiting.
Investigations not required.

**Premature Adrenarche**

‘Pubic hair development before 8years in females and 9years in males’

No other signs of sexual development.

Maybe be slight ↑ growth rate.

Usually self-limiting.

Investigations (to exclude PP):
- d. Ultrasound of ovaries and uterus.
- e. Bone age.

**Delayed Puberty**

‘Absence of pubertal development by 14years in females and 15years in males’

More common in males – mostly due to constitutional delay.

**Causes**

1. Constitutional delay of growth and puberty

2. Hypergonadotrophic hypogonadism
   (High gonadotrophin secretion – Indicating gonadal response is impaired)

Chromosomal abnormalities: – Females only.
- Turner’s syndrome (45 XO)
- Klinefelter’s syndrome (47 XXY).

Steroid hormone enzyme deficiencies.

Acquired gonadal damage:
- Ovarian damage e.g. chemotherapy
- Torsion of testis
- Testicular damage e.g. chemotherapy, radiotherapy
Autoimmune disorder
Post-surgery

Anorchia (absence of one/both testes)
e.g. foetal vascular accident – Males only.

3. Hypogonadotrophic hypogonadism
   (Low gonadotrophin secretions – Failure of LH and FSH release)

Systemic disease:
- CF
- Excess physical training
- Organ failure
- Anorexia nervosa/ Starvation
- Crohn’s disease
- Severe asthma

Hypothalamopituitary disorders:
- Panhypopituitarism
- Isolated gonadotrophin / GH deficiency
- Intracranial tumours
- Kallmann’s syndrome

Acquired hypothyroidism

Investigations

Males:
- a) Pubertal staging – Esp. testicular volume.
- b) Identification chronic systemic disorders.

Females:
- a) Karyotype.
- b) Measure thyroid and sex steroid hormones.

Management

Identify any underlying pathology. Reassure puberty will occur.

To speed up:

Males – Oral oxandrolone (accelerate growth but not secondary sexual characteristics) or Low-dose testosterone (accelerate growth and secondary sexual characteristics).

Females – Oestradiol.

Important Note
These notes were written by Harriet Wood, as a medical student in 2009. They are presented in good faith and every effort has been taken to ensure their accuracy. Nevertheless, medical practice changes over time and it is always important to check the information with your clinical teachers and with other reliable sources. Disclaimer: no responsibility can be taken by either the author or publisher for any loss, damage or injury occasioned to any person acting or refraining from action as a result of this information.

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