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Obstetrics & Gynaecology - Topic 23 - Normal and abnormal puberty

Normal Puberty

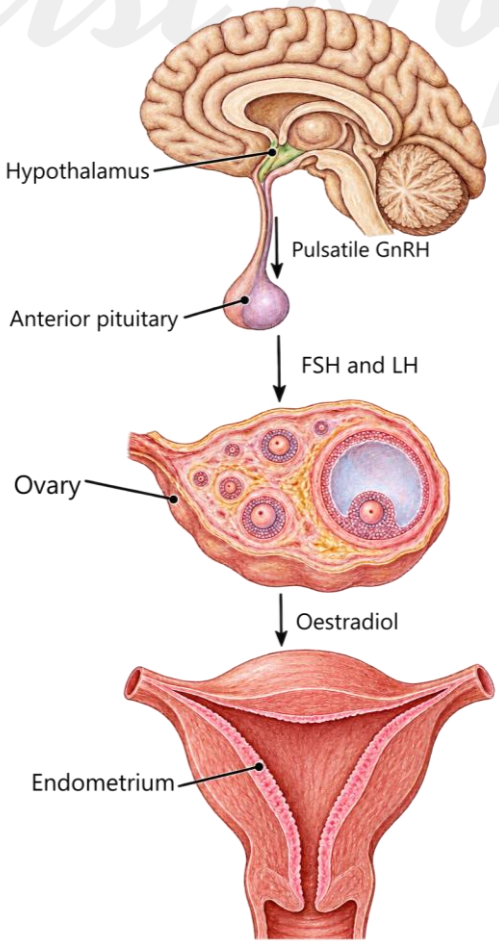
- Puberty is the transition during which reproductive function matures, secondary sexual characteristics develop and growth accelerates.

Hormonal Activation

1. Gonadal Activation and Growth

- Pulsatile gonadotropin-releasing hormone secretion from the hypothalamus activates pituitary release of luteinising hormone and follicle-stimulating hormone.
- These gonadotropins stimulate the ovaries to produce oestradiol and support follicular development.
- Oestradiol promotes breast and uterine development and contributes to the growth spurt and later closure of the growth plates.
- Growth hormone and insulin-like growth factor 1 contribute to the pubertal growth spurt.
- Skeletal maturation explains why rapidly progressive early puberty can initially increase height but reduce remaining growth potential.

2. Adrenarche and Its Distinction from Gonadal Puberty

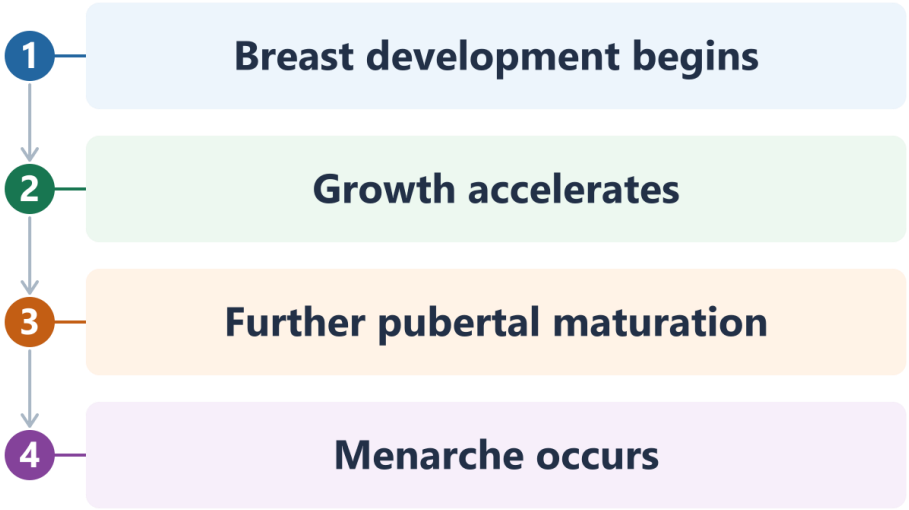


Pubertal activation links the hypothalamus, anterior pituitary and ovary; oestradiol promotes endometrial and other reproductive development

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- Adrenal androgen production increases separately during adrenarche and contributes to pubic hair, axillary hair, body odour and acne.
- Pubic hair alone therefore does not prove activation of the complete hypothalamic-pituitary-ovarian axis.

Usual Sequence in Girls



Thelarche, Hair Development and Growth

- Breast budding, called thelarche, is usually the first visible sign of true puberty and commonly begins between eight and thirteen years.
- Pubic-hair development may occur before or after breast development because adrenal and ovarian maturation are related but distinct processes.
- Growth accelerates, the uterus enlarges and body composition changes as puberty progresses.

Menarche, Early Cycles and Tempo

- Menarche usually occurs about two to three years after breast development begins, often after the fastest phase of height growth.
- The first cycles may be irregular and anovulatory, but very heavy bleeding, prolonged gaps or severe symptoms still require assessment.
- The sequence and rate of change are more informative than a single age or one isolated physical finding.

Assess Pubertal Stage Respectfully

- Tanner staging describes physical development, while height measurements and growth velocity show the pace of maturation.
- Explain why an examination is needed, obtain appropriate consent and assent, offer a chaperone and protect the young person's dignity.
- Distinguish true breast gland development from fatty tissue, especially when weight is high.

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Breast stage	Clinical description
Stage I	Prepubertal appearance without glandular breast development.
Stage II	A breast bud develops and the areola enlarges.
Stage III	Breast and areola enlarge without separate contour.
Stage IV	The areola and papilla form a secondary mound.
Stage V	The breast has a mature contour, with projection mainly of the papilla.

- Record breast and pubic-hair stages separately rather than assuming that they must always match.

Pubic-hair stage	Description
Stage I	There is no sexual pubic hair.
Stage II	Sparse, lightly pigmented hair appears mainly along the labia.
Stage III	Hair becomes darker, coarser and curlier over the pubic region.
Stage IV	Hair has an adult character but covers a smaller area.
Stage V	Adult distribution extends to the medial thighs.

- Do not perform an unnecessary intimate examination solely to complete a score when reliable clinical assessment can be achieved more appropriately.

Recognising Abnormal Puberty

When to Evaluate

Age Thresholds for Early or Delayed Puberty

- Breast development before eight years raises concern for early puberty, especially when it progresses rapidly or is accompanied by accelerated growth.
- Absence of breast development by thirteen years requires evaluation for delayed puberty.
- Absence of menarche by fifteen years, or more than three years after thelarche, requires assessment for primary amenorrhoea.

Progression, Growth and Individual Interpretation

- Stalling or regression of pubertal development, marked growth failure, virilisation, neurological symptoms or major psychological distress also warrants evaluation.

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- Age thresholds guide assessment but must be interpreted with the child's growth pattern, symptoms and family background.

History and Examination

- Ask when each change began, whether it is progressing and whether there is a family history of early or late puberty.
- Review growth records, nutrition, weight change, intense exercise, chronic disease, previous cancer treatment and prescribed or accidental hormone exposure.
- Ask about headache, visual change, seizures, loss of smell, abdominal pain, vaginal bleeding and symptoms of thyroid or other endocrine disease.
- Assess height, weight, growth velocity, blood pressure and pubertal stage, and look for dysmorphic features, skin lesions or signs of chronic illness.
- A private, age-appropriate discussion should include wellbeing, body image, eating behaviour, safety and pregnancy possibility where relevant.

Delayed Puberty

- Delayed puberty means that expected pubertal development has not begun or progressed at the usual age.
- Assessment distinguishes a constitutional delay from endocrine, gonadal or other underlying disease.

Aetiological Groups in Delayed Puberty

1. Constitutional Delay

- Constitutional delay is a self-limited late maturation pattern, often with delayed bone age and a family history of late puberty.
- It is a diagnosis made after considering other causes and is less common in girls than in boys.
- Growth and pubertal progression must be followed rather than assuming that every late-developing girl will simply catch up.

2. Functional Hypothalamic Suppression

- Low energy availability, undernutrition, eating disorders, intense exercise and severe stress can reduce hypothalamic hormone signalling.
- Chronic inflammatory, renal, gastrointestinal or other systemic disease can delay puberty through nutritional and physiological effects.
- The ovaries may be capable of responding normally once the underlying problem is treated.

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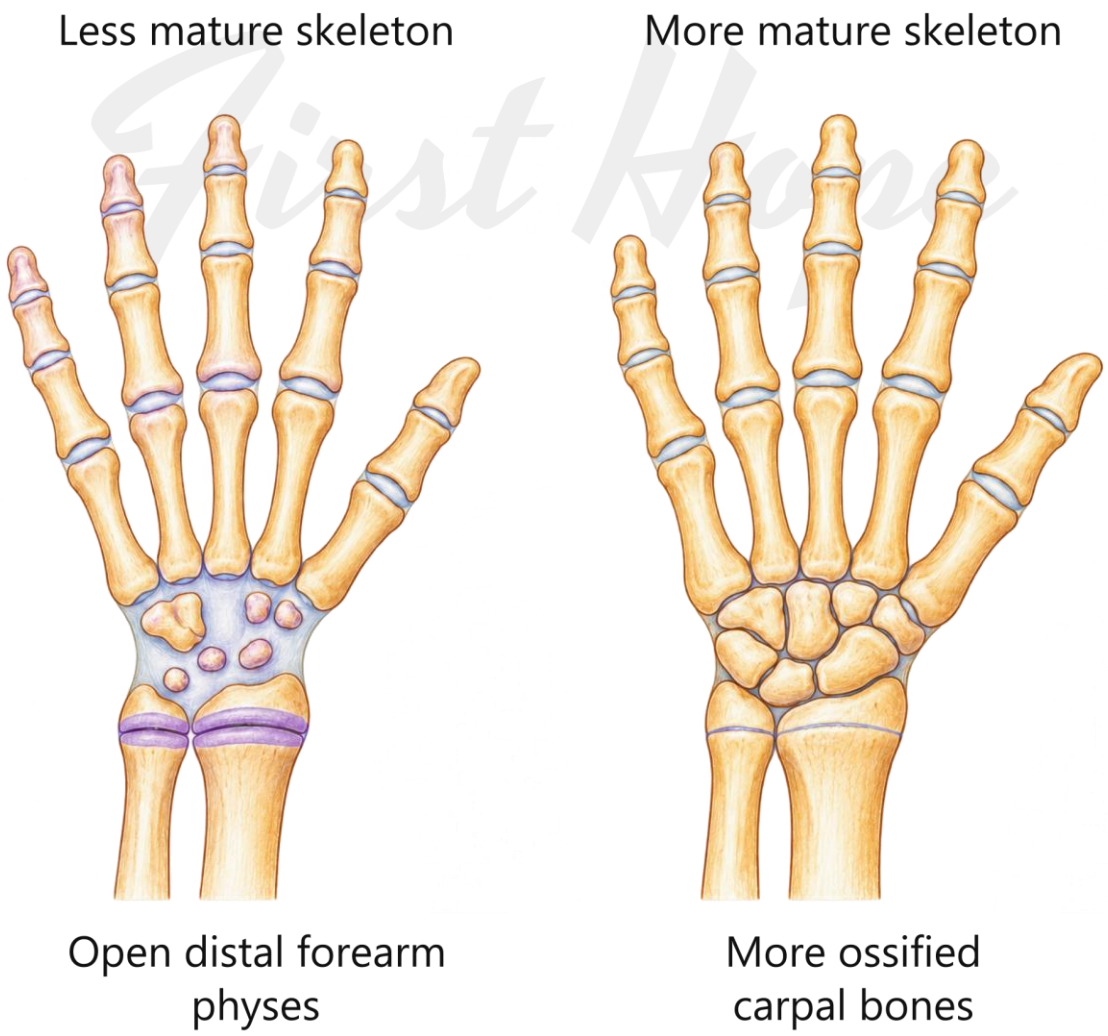
3. Permanent Hypothalamic or Pituitary Disease

- Congenital gonadotropin deficiency, including some conditions associated with reduced smell, can prevent normal pubertal activation.
- Tumours, previous irradiation, surgery or other hypothalamic-pituitary disease can also reduce gonadotropin secretion.
- Other pituitary hormone deficiencies may coexist, so growth, thyroid and adrenal function require attention when indicated.

4. Primary Ovarian Insufficiency

- Gonadal dysgenesis, including Turner syndrome, can prevent normal ovarian oestrogen production.
- Autoimmune disease, chemotherapy, radiotherapy or other ovarian injury can produce acquired insufficiency.
- Low oestradiol with raised gonadotropins suggests ovarian failure, while low oestradiol with low or inappropriately normal gonadotropins suggests a central cause.

Growth, Bone Age and Initial Blood Tests



Hand and wrist skeletal maturation can help interpret growth and pubertal development

- Plot growth and obtain bone age when indicated, recognising that a delayed bone age supports delayed maturation but does not identify its cause alone.

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