DISEASES OF THE GONADS

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<table>
<thead>
<tr>
<th>Organ</th>
<th>before puberty</th>
<th>after puberty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bones</td>
<td>eunuchoid appearance</td>
<td>osteoporosis</td>
</tr>
<tr>
<td>Hair growth</td>
<td>lack of beard growth, forehead hair line, pubic hair line</td>
<td>diminishing sexual hair growth</td>
</tr>
<tr>
<td>Larynx</td>
<td>no voice change</td>
<td>-</td>
</tr>
<tr>
<td>Skin</td>
<td>decreased activity of sebaceous glands, no acnes</td>
<td>atrophy wrinkles</td>
</tr>
<tr>
<td>Bone marrow</td>
<td>anemia</td>
<td>anemia</td>
</tr>
<tr>
<td>Muscles</td>
<td>underdeveloped</td>
<td>atrophy</td>
</tr>
<tr>
<td>Penis</td>
<td>infantile</td>
<td>no change in size</td>
</tr>
<tr>
<td>Organ</td>
<td>before puberty</td>
<td>after puberty</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Prostate</td>
<td>underdeveloped</td>
<td>atrophy</td>
</tr>
<tr>
<td>Spermatogenesis</td>
<td>not initiated</td>
<td>halted</td>
</tr>
<tr>
<td>Libido, Potency</td>
<td>no</td>
<td>loss</td>
</tr>
</tbody>
</table>
Forms of hypogonadism

Central, secondary, hypogonadotrop
LH, FSH low

Gonadal, primary, hypergonadotrop
LH, FSH high
Causes of central hypogonadism

- Kallmann-Syndrom
  - GnRH deficiency + Anosmia/Hyposmia

- Prader-Willi-Labhart syndrom
  - GnRH deficiency, obesity, low body height, newborn hypotony, diabetes mellitus type 1, strabismus, scoliosis, mental retardation.

- Pituitary insufficiency

- Hyperprolactinemia
Therapy of central hypogonadism

- Androgens
  - Testosteron enanthat, cypionat i.m., transdermal, per os (hepatotoxic)
- LH, FSH, hCG
  - i.v. for fertility
- GnRH, GnRH-agonists
  - pulsatile, pump for fertility
Causes of male gonadal hypogonadism

1. Klinefelter syndrome (small testes, no spermatogenesis, gynecomastia, breast cancer).
2. del Castillo syndrome, Sertoli cell only syndrome, no spermatogenesis
3. Noonan Syndrome (male Turner sy.)
4. Chemical and biological testis damage
Primary amenorrhoea
puberty

Secondary amenorrhoea
pregnancy
menopause
Causes of amenorrhea

• Hypothalamus
  - Kallmann Syndrome
  - Anorexia nervosa

• Hypophyse
  - Sheehan Syndrome
  - (ischemic necrosis of the pituitary)
  - Hyperprolactinemia

• Ovaries
  - Dysgenesis of the ovaries (Turner syndrome)
  - Stein-Leventhal syndrome, PCO
Turner syndrome
gonadal dysgenesis

Primary amenorrhea
Streak gonads
Pterygium colli
Small stature (133-153 cm)

Cardiovascular Anomalies

Estrogen for secondary sexual characteristics

GH for growth promotion
Pseudohermaphroditism: chromosomal and gonadal sex is different from phenotype

Female pseudohermaphroditism
- Chromosomal and gonadal sex: woman
- Phenotype: male

Male pseudohermaphroditism
- Chromosomal and gonadal sex: male
- Phenotype: female
HYPERANDROGENISM
Hirsutism
androgen-dependent regions
e.g.: face, breast, belly

Hypertrichosis
Non-androgen-dependent regions
e.g. extremities
Virilisation

In utero virilisation
Intersexuality –
female pseudohermaphroditism

Virilisation in adults
clitoris hypertrophy
hirsutism
male type baldness
deeper voice
secondary amennorhoea
Causes of virilisation

1. **Endocrine diseases**
   - **Adrenal causes**
     - Androgen-secreting adenoma
     - Androgen-secreting adrenocortical cancer
     - Cushing syndrome
     - Congenital adrenogenital syndrome
   - **Ovarian causes**
   - Akromegaly

2. **Idiopathic**

3. **Drugs**

4. **Other – e.g. anorexia nervosa**
Pathogenesis of adrenogenital syndromes

Stressors (hypoglycemia, hypotension, surgery, fever, injury)

Circadian regulation

Hypothalamus

CPH

Vasopressin

Pro-inflammatory cytokines

ACTH

Adrenals

Other steroids
Adrenogenital syndrome (AGS)

Deficiency of enzyme products (cortisol, mineralocorticoids)

AND

Increased concentration of steroid precursors

Virilisation
Female pseudohermaphroditism
Hydroxylase deficiency

Most frequent cause of AGS

Major forms:

- Classic 21-Hydroxylase deficiency (1:14.000)
  - Salt-losing form
  - Simple virilising form

- Non-classic 21-Hydroxylase deficiency (1:50-1:1000)
  - Late-onset Form (postnatal virilisation, hirsutism, infertility, menstrual cycle abnormalities)
  - Asymptomatic forms: only hormonal examinations can detect them
Pathogenesis of 21-hydroxylase deficiency

Testosterone
-hydroxylase deficiency

- Salt-losing form:
  - deficiency of cortisol and aldosterone: hyperkalemia, hyponatremia, fluid loss, shock.
  - Increased production of DHEA, androstendion and testosterone, therefore virilisation.
**Diagnosis:**

increased serum concentration of steroid precursors: 17-OH-Progesteron (>80 ng/ml) and urinary pregnantriol.

Synacthen test (tetracosactid, 250 μg i.v.)

**Therapy of 21-hydroxylase deficiency**

- **Glukokortikoids**
  - Adults 20-30 mg/Tag

- **Hydrocortison:**
  - Adults: 20-30 mg/Tag

- **Dexamethasason**
  - Adults: 0.25-0.5 mg am Abend
Polycystic Ovarian Syndrome (PCO), Stein-Leventhal Syndrome
PCO diagnostic criteria

- Hyperandrogenism with or without skin alterations
- Abnormalities of menstrual cycle – raromenorrhoea or secondary amenorrhoea
- Other causes of hyperandrogenism excluded (e.g.: adrenogenital syndrome, Cushing syndrome)
Hormone results in PCO

- Increased serum testosterone and DHEAS
- High insulin concentrations (oral glucose tolerance test, 75 g)
- Increased LH/FSH ratio
Therapy of PCO

- Weight reduction.
- Metformin against insulin resistance
- Contraceptive pills – estrogen + cyproterone-acetate antiandrogenic protesterone derivative
- Induction of ovulation (Clomiphen, LH, FSH, GnRH agonists)
- Gynecologic interventions: laser coagulation, elektrocoagulation, partial wedge resection of the ovaries