Thyroid disorders in children

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objectives

• By the end of this session the student will list the common causes of thyroid disorders
• Differentiate between hypo and hyperthyroid disorders
• Evaluate a child with thyroid disorder
Comment on these photos
Congenital hypothyroidism

- **Agenesis** (No goiter)
- **dysgenesis** (aplasia, hypoplasia, ectopic gland) are the commonest causes.....85%
- **Dyshormonogenesis** (10%) and a goiter will be present. **Pendred syndrome** with sensorineural deafness is the commonest (often euthyroid).
- **Transplacental maternal TSH receptor blocking Abs (TRBAb)** account for 5% of cases.
- Pituitary failure and maternal ingestion of goitrogens are other causes.
SYMPTOMS OF CONGENITAL HYPOTHYROIDISM

• There is a tendency towards prolonged gestation with 1/3 of pregnancies lasting 42 weeks or more

• Prolonged jaundice

• Lethargy

• Constipation

• Feeding problems

• Cold to touch
<table>
<thead>
<tr>
<th>Signs of Congenital Hypothyroidism</th>
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<tbody>
<tr>
<td>Skin mottling and Dry skin</td>
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<tr>
<td>Umbilical hernia and Distended abdomen</td>
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<tr>
<td>Jaundice</td>
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<tr>
<td>Macroglossia</td>
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<tr>
<td>Large fontanels</td>
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<td>Wide sutures</td>
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<tr>
<td>Hoarse cry</td>
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<tr>
<td>Muscle Hypotonia</td>
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<tr>
<td>Slow reflexes</td>
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<tr>
<td>Bradycardia</td>
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<td>Mental retardation</td>
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</table>
Other clinical picture

- Puffy myxedematous face
- Depressed nasal bridge with hypertelorism
- Large protruding tongue with an open mouth
- Cold, mottled skin
- Short neck
- Palpebral fissures are narrow
- Short fingers
- Fat deposits between neck and shoulders
- Hair is coarse, brittle and scanty
- Hairline reaches far down on the forehead
Wormian Bones
Screening for CH

• TSH at 7 days of life......postnatal TSH surge.
• In CH usually TSH > 20-50 μmol/l.
• Pituitary failure will be missed.
• Be alerted to a more generalized pituitary problem if there is: hypoglycemia, small phallus, or midline defects.
Treatment

- L- Thyroxine
- As early as possible before 3 month after which mental retardation is irreversible
• A 11 years female with short stature for age, with constipation, recently become less sociable, gained weight; her school performance is deteriorating and she is intolerant to cold.

• What other points in history you want to get?
• There may be also a presenting goiter.
• Typical facies with dry pale skin and periorbital puffiness.
• Typically no effect on intellect.
Causes of juvenile hypothyroidism

- Hashimoto thyroiditis......... More common in girls who may have initial thyrotoxicosis or be euthyroid or hypothyroid at presentation.
- Hashimoto may be associated with Down, Turner and Klinefelter syndromes as well as SLE & other autoimmune disorders.
- A goiter may be present initially with no clinical features of disturbed thyroid function at first.
- Other causes of JH include ingestion of goitrogens, iodine deficiency, hypothalamic/pituitary disorders and post thyroidectomy.
• Antithyroglobulin and antimicrosomal antibodies are found.
• Serum T4 is low (earlier than T3).
• Bone age is delayed.
• Treatment is with thyroxine.
Hyperthyroidism

• 1ry with decreased TSH.
• 2ry with increased TSH (pituitary).
• **Graves disease** is the commonest cause which is due to thyroid stimulating immunoglobulins TSIs directed against the TSH receptor.
• Other causes include: toxic adenoma, subacute thyroiditis (often a painful goiter) and initially in Hashimoto thyroiditis.
• Females are more commonly affected (F:M 5:1).
clinical manifestations

- Weight loss, ↑ growth rate, nervousness, irritability, fatigue, ↑ sweating, diarrhea, ↑ appetite, dislike of hot weather, palpitation, fine tremor.
- Pretibial myxedema and Graves ophthalmopathy (chemosis, diplopia, and exophthalmos).
- Rx may require carbimazole (or 2nd line propylthiouracil); propranolol especially for thyroid storm. Thyroidectomy & radioactive iodine in older patients.
Neonatal hyperthyroidism

- Rare case caused by transplacental transfer of TSIs.
- Occurs in 1-2% of cases of maternal Graves disease.
- Remember that since the condition is caused by immunoglobulins and not thyroid hormone transfer, the mother may not be clinically thyrotoxic around the time of birth.
The baby presents within the 1\textsuperscript{st} week with irritability, diarrhea, temperature instability, tachycardia (sometimes SVT) and weight loss.

Features of heart failure may be present.

The disease is transient and disappears with the disappearance of antibodies, usually within 2-3 weeks.

Thyroid storm may occur if thyrotoxicosis is undetected and left untreated: fever, tachycardia, irritability, sweating and diarrhea. Treat with i.v carbimazole, $\beta$ blockers & rehydration.
Congenital thyrotoxic goitre
Goiter

- A goiter may be classified as:

1. **Toxic goiter** --- Graves disease, toxic adenoma, subacute thyroiditis, toxic multinodular goiter;

2. **Non-toxic** --- Hashimoto thyroiditis, simple goiter of iodine deficiency (especially **puberty** where there are increased requirements), ingestions of goitrogens, IEM caused by dyshormonogenesis, or euthyroid goiter, a **simple colloid goiter**, common in the 2\(^{nd}\) decade, that may resolve spontaneously in later life or become a multinodular goiter.
KILPATRIK GRADING OF GOITRE

• Grade 0: Not visible neck extended & Not palpable
• Grade 1: Not visible, but palpable
• Grade 2: Visible only when neck is extended & on swallowing,
• Grade 3: Visible in all positions
• Grade 4: Large goiter
Approach to thyroid disorders

• History
• Clinical examination
• Growth parameters
Investigations of thyroid function

- **TSH**: NR is 0.4-4 µmol.
  
  ↑ in 1ry hypothyroidism & pituitary hyperthyroidism.
  
  ↓ in 2ry hypothyroidism & 1ry hyperthyroidism.

- **Total T3 & T4**: this gives measurements of thyroid hormones bound to binding proteins and thus are unreliable since they can be ↑ by estrogens for example and ↓ by protein-losing states as NS.
Investigations, cont...

- **Serum free T3**: ↑ early in thyrotoxicosis (cf T4) and so is more important in detecting thyrotoxicosis.

- **Serum free T4**: ↓ earlier than T3 in hypothyroidism and is thus more important in detecting hypothyroidism.

- **TRH test**: used if the patient is expected to have thyroid disease but the TFTs are equivocal. It involves measurement of TSH before, 20 min and 60 min post TRH administration. In normal individuals TSH rise by 20 min (by 1-20 µmol/l) & fall to normal levels by 60 min.
Investigations ....cont

- **Autoantibody screen:**
  - **Graves**- thyroid stimulating immunoglobulin (TSI), thyroid growth immunoglobulin (affects size of goiter), thyroid ophthalmological immunoglobulin (causes eye signs);
  - **Hashimoto thyroiditis**- Antimicrosomal and antithyroglobulin antibodies.

- **Bone age:** delayed in hypothyroidism.
- **Ultrasound:** if nodules are felt.
- **Thyroid scan:** detects uptake of pertechnetate (hot areas), useful to detect ectopic thyroid tissue.
• In the KSA a national cross-sectional epidemiological survey for studying iodine status was conducted among Saudi schoolchildren aged 8–10 years in 1997 [9]. The median national UIC was 180 μg/L and the total goiter rate (TGR) ranged from 8% to 30%. Nationally the proportion of the population with UIC less than 100 was 23%. The southern province of Jazan had the lowest median UIC (110 μg/L) and the highest percentage (45%) of subjects with a UIC < 100 μg/L [9]. The IDD control program using the USI strategy started in 1997, and the Saudi Standards, Metrology and Quality Organization (SASO) recommend that iodine content of salt must be 70–100 ppm in all food salt [10]. Since the national survey in 1997, no follow up survey or monitoring system has taken place [4] to assess the iodine nutrition status in the population neither nationally or in the Jazan region.
thank you