ENDOCRINE DISORDERS

Congenital Hypothyroidism (CH)

What is Congenital Hypothyroidism (CH)?

Congenital hypothyroidism (CH) is one of the most common preventable causes of mental retardation in children. According to the Philippine NBS data, (December 2021) 1 out of 2,649 screened newborns has CH. The most common etiology of CH is thyroid dysgenesis (TD): absent thyroid, ectopic or hypoplastic thyroid. In rare cases, CH results from mutations in the genes that control thyroid gland development including thyroid transcription factor (TTF-2) and paired box-8 protein (PAX-8). Rapid detection by newborn screening, prompt confirmatory testing and Levothyroxine administration can prevent severe mental retardation and impaired growth due to CH.

PATHOPHYSIOLOGY

Normal thyroid hormone levels in the body are maintained by a feedback mechanism involving the hypothalmus, pituitary and thyroid gland (See figure 1). The hypothalamus senses low circulating levels of thyroid hormone (T3 and T4) and responds by releasing thyrotropin releasing hormone (TRH). TRH stimulates the anterior pituitary to produce thyroid stimulating hormone (TSH). TSH, in turn, stimulates the thyroid gland to produce thyroid hormone until levels in the blood return to normal. Normal thyroid hormone levels exert a negative feedback to the hypothalamus and the anterior pituitary, thus controlling the release of both TRH from hypothalamus and TSH from anterior pituitary gland. When the thyroid gland does not produce enough T4 and T3, the pituitary gland compensates by producing high levels of TSH. This biochemical profile of low T4 level and high TSH is a pattern consistent with Primary CH. Having the correct level of thyroid hormone in the body is important, especially in the first two years of life, because it ensures normal growth of the brain, bones, and nervous system.

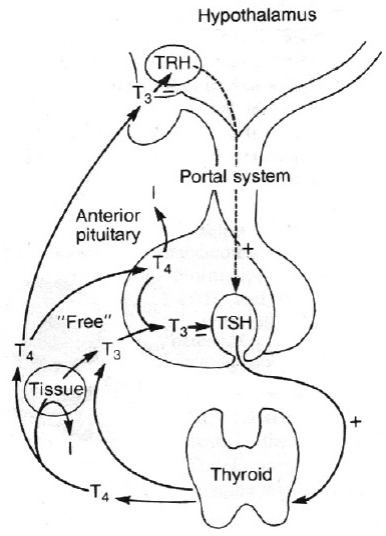

Figure 1. The hypothalamic-pituitary-thyroid axis (HPT axis)

CLINICAL FEATURES

Signs and symptoms of congenital hypothyroidism are usually not apparent at birth:

- Decreased activity
- Large anterior fontanelle
- Poor feeding
- Poor weight gain
- Small stature for poor growth
- Prolonged Jaundice
- Decreased stooling or constipation
- Hypotonia
- Hoarse cry or weak cry
- Developmental delay
- Coarse facial features
- Macroglossia
- Large fontanelles
- Umbilical hernia
- Mottled, cool, and dry skin
- Pallor
- Myxedema
- Goiter

DIAGNOSIS

Newborn screening for primary CH is done by determining the thyroid stimulating hormone (TSH) level on a dried blood spot. If the TSH is significantly elevated, this signifies that the baby is at risk for CH and therefore needs confirmatory thyroid tests. An elevated serum TSH and a low serum FT4 confirms primary CH. Thyroid imaging (thyroid scan or ultrasound) is recommended to document etiology.

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TREATMENT AND MONITORING

Immediate diagnosis and treatment of congenital hypothyroidism in the neonatal period is critical to normal brain development and physical growth. Treatment started within the first two weeks of life usually prevents neurodevelopmental delays. Recommended treatment is the daily administration of Levothyroxine. Only the tablet form of Levothyroxine is currently approved for therapeutic use. The tablets should be crushed, mixed with a few milliliters of water, and fed to the infant directly into the mouth. It is not recommended that Levothyroxine be mixed with soy formula or with formula containing iron, as these interfere with absorption of the medication. Thyroid hormone replacement and medical monitoring may be required for life.

Children with congenital hypothyroidism should be monitored clinically and biochemically. Clinical parameters should include linear growth, weight gain, head circumference, developmental progression, and overall well-being. Serum T4 or FT4 and TSH should be monitored at regular intervals. If a child has been confirmed with CH, it is best to co-manage the patient with a pediatric endocrinologist.

Prognosis

Early diagnosis and optimal treatment of congenital hypothyroidism prevents severe mental retardation, neurologic complications and physical delays. Even with early treatment, some children may demonstrate mild delays in areas such as reading comprehension and arithmetic. Although continued improvement in IQ has been documented in treated patients through adolescence, some cognitive problems may persist. These may include problems in visuospatial, language, and fine motor function. Defects in memory and attention have been reported.

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