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A newborn of mother with thyroid disease

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ABSTRACT

Thyroid diseases are frequent endocrinopathies during childbearing, affecting about 5-20% of pregnant women. They can appear in women both before and during pregnancy. The most common form of thyroid disease is hypothyroidism, mainly Hashimoto's disease. Hyperthyroidism is less frequent, but the most common form is Graves' disease. Disorders of thyroid function in the newborn cause permanent consequences mainly in the development of the nervous system. Therefore, it is very important to properly diagnose and quickly apply treatment when a disorder is detected. In Poland there is a screening program for newborns detecting congenital hypothyroidism. In this program the TSH level is measured in second or third day of life. Diagnosis of hyperthyroidism in children of mothers with Graves' disease consists of examining the levels of TRAb antibodies in the mother especially in the third trimester, and in the umbilical cord blood or blood of the newborn. It should also be observed if symptoms of fetal hyperthyroidism are present. Treatment of both hypothyroidism and

hyperthyroidism should be started without undue delay. Both of these neonatal endocrinopathies are mostly transient and retreat with the elimination of antibodies, i.e. within 1-6 months. Therefore, it is necessary to verify the diagnosis and the need of further treatment after this time.

Key words: hyperthyroidism; hypothyroidism; newborn; TRAb; screening

INTRODUCTION

Thyroid diseases are one of the most common endocrine problems in childbearing. Autoimmune thyroid disease affects 5-20% (depending on the source) of pregnant women, and present antithyroid antibodies can penetrate the placenta affecting both the fetus and later the newborn. [1, 2] Thyroid disease can manifest itself both before and during pregnancy.

Hypothyroidism in pregnancy is a frequent endocrinopathy, according to various authors concerns 0.4-11% of women. The main cause is Hashimoto's disease- autoimmune thyroiditis and iodine deficiency. [1, 3, 4]

Symptoms in pregnancy

Young women with poorly balanced thyroid gland are exposed to many complications in pregnancy, including:

- miscarriage,
- premature delivery,
- premature separation of the placenta
- anemia,
- pregnancy hypertension,
- gestational diabetes.

The children of these mothers have a higher risk of:

- perinatal acute respiratory failure,
- congenital defects,
- a reduced level of IQ,
- LGA (large for gestational age, too large birth weight),
- intrauterine and perinatal death.

It is believed that the equalization of the hormonal balance with L-thyroxine reduces the risk of the above complications. [1, 3-8] The presence of antithyroid antibodies may, however, increase the risk of obstetric failure and post-partum thyroiditis.

Mothers autoimmune thyroiditis may also affect the work of the thyroid in the newborn. The main problem are TRBAb (thyrotropin receptor blocking antibodies), which occur in both Graves' disease and lymphocytic thyroiditis. [1]

Diagnostics and treatment

Hypothyroidism induced by TSH receptor blocking antibodies affects about 1-2% of children with congenital hypothyroidism, usually detected in the third day of life screening test. Treatment with L-thyroxine should be started until the 2nd week of life. The recommended initial dose of L-thyroxine is 10-15 μg/kg/day. Newborns with deep hypothyroidism defined as very low levels of TT4 or FT4 should be treated with a higher, and newborns with mild and moderate underactivity with a lower initial dose. L-thyroxine should be given orally, the tablet may be crushed and, if necessary, dissolved in a small amount of water or breast milk. If there is no possibility of oral treatment, we can use intravenous therapy, but the dose should not exceed 80% of the oral dose. [1, 9]

The early substitution of L-thyroxine allows for the equalization of thyroid hormone deficiencies and give the child a possibility to grow properly. Hypothyroidism due to maternal antibodies is mostly temporary and withdraws with the elimination of antibodies, i.e. within 1-6 months. Therefore, it is necessary to verify the diagnosis and needs of further treatment after this time. [1]

Neonatal screening

Since 1995 there is in Poland a screening program to detect congenital hypothyroidism in newborns. According to the recommendations, TSH tests are performed with a full drop of blood on the second or third day of life. If the result is> 12 μIU/ml, further diagnostics should be implemented. [10, 11]

Hyperthyroidism in pregnancy affects from 0.1% to 2.7% of women and in the majority of cases it is Graves disease. The children of these mothers are at risk of developing neonatal hyperthyroidism with all its potential consequences. Therefore, close monitoring of the level of anti-TSH receptor antibodies is required in these children. The risk is particularly high when the level of antibodies exceeds the upper limit of normal by more than five times. The frequency of transient hyperactivity is unknown, but according to observational cohort studies, it is around

1-2% and the mortality rate reaches even 20%. The rare causes of non-immune hyperthyroidism in the fetus are activation mutation of the receptor for TSH and McCune-Albright syndrome. [2, 12-13]

Antithyroid antibodies

Anti-TSH receptor antibodies (TRAb) belong to class G immunoglobins, meaning they can freely cross the placenta, especially in the second half of pregnancy. There are two types of TRAb antibodies. The first type works as an initiator, combines with the TSH receptor and stimulates thyroid follicular cells to produce hormones. The other one acts as an inhibitor, blocking the TSH receptor without initiating intracellular relays. Therefore, these antibodies can cause both hypothyroidism and hyperthyroidism [13].

Symptoms of hyperthyroidism in the fetus and newborn baby

Symptoms of fetal hyperthyroidism are:

• tachycardia (above 160/min),
• delay in intrauterine growth,
• premature delivery,
• damage to the myocardium with generalized edema of the fetus,
• accelerated skeletal maturation,
• craniosynostosis.

Symptomatic cases can be treated by giving the mother antithyroid drugs. [2, 13]

Neonatal hyperthyroidism is manifested by thyroid gland, low birth weight, orbitopathy, eyelid retraction, hyperthermia, diarrhea, difficulty in feeding and poor body weight gains, tachycardia, hypertension, small fontanelle, heart failure, hepatomegaly, splenomegaly, thrombocytopenia. [2, 12-13]

Proper treatment of newborn infants with hyperthyroidism helps reduce the risk of complications related to the disease, and contribute to the proper development of the nervous system. Newborns who achieve euthyroidism achieve IQ at the level of their healthy peers, while children who have not achieved the proper level of thyroid hormones at a later age achieve below-average results in intelligence tests. [13]

Diagnostics

Diagnosis of children of mothers with Graves' disease should begin even during pregnancy. The level of TRAb should be measured at the beginning of the pregnancy and closely monitored

from 20-24 Hbd. Pregnancy in women with high level of TRAb should be considered as an increased risk pregnancy, and should be closely monitored, including ultrasound. Ultrasound examination is a non-invasive method allowing to assess the condition of the thyroid gland in the fetus, it can also show the goitre and help evaluate the vascularization of the gland (increased in hyperthyroidism, reduced in hypothyroidism). In addition, it allows the assessment of fetal skeletal maturity, which may be accelerated in fetal thyrotoxicosis, and fetal heart rate (> 160 /min is a symptom of hyperthyroidism). [12]

An important indicator of neonatal hyperthyroidism is the level of TRAb antibodies in the umbilical cord blood or in the blood of the newborn. If the level of TRAb antibodies is normal, you should proceed as if you were a newborn mother with no thyroid diseases, ie to perform a TSH screening test in the third day of life. If the TRAb level determination is impossible or the result is positive, the TSH and fT4 levels should be performed at 3-5 days of age. If there are no deviations, repeat these tests at 10-14 days of age, 4 weeks of age and 2-3 months of age. Latest examinations are aimed at catching a small population of newborns with a subsequent presentation of thyrotoxicosis, which may be related to the mother taking thyroid drugs or with TRAb as an inhibitor. [2]

Treatment

In the case of biochemical hyperthyroidism without the usual symptoms, the inclusion of treatment is still controversial. Iinclusion of 0.2-0.5 mg/kg body weight of tiamazole in 2 divided doses should only be considered. [13]

In the case of symptomatic hyperthyroidism, treatment should start with the inclusion of 0.2-0.5 mg/kg tiamazole per day in 2 divided doses. In the case of severe symptoms of overactivity of the sympathetic system, consideration should be given to adding propranolol at a dose of 2 mg/kg body weight/day in 2 divided doses for 1-2 weeks. In the case of haemodynamic instability, the use of a 5% solution of Lugol's iodine in a dose of 1 drop (0.05ml) 3 times daily or potassium iodide 1 drop (0.05ml) once a day should be considered. The use of iodine is aimed at inhibiting colloid proteolysis and limiting the release of hormones already produced in the thyroid gland. In the most severe cases, glucocorticoids are used due to inhibit the transformation of T4 to T3 and prevent the development of relative adrenal insufficiency, caused by rapid degradation of cortisol by excess thyroid hormones [2, 13]

The level of TSH and fT4 should be measured once a week. When the level of fT4 reaches the reference values for age, the dose of thiamazole should be reduced. The average duration of treatment lasts 1-2 months.

If the result of TSH and fT4 indicates primary or central hypothyroidism, repeat the results after one week. If the diagnosis is confirmed, implement a diagnosis of the deficiency of other pituitary hormones and start treatment with hypothyroidism at a dose of 10 μg/kg per day. Control TSH and fT4 levels should be performed every 2-3 weeks and the dose of levothyroxine should be adjusted to current test results.

The vast majority of cases of neonatal Graves' disease are transient and usually last up to 8-20 weeks, that is, until the maternal anti-TSH receptor antibodies (TRAb) disappear. [2.13]

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