NEONATAL HYPERINSULINEMIC HYPOGLYCEMIA

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Introductions. Hyperinsulinism can occur at different periods of childhood, but is most common in newborns. Persistent hyperinsulinemic hypoglycemia is the most common cause of early childhood hypoglycemia. Hyperinsulinism is a condition that is caused by inadequate secretion of insulin by β-cells of the newborn's pancreas [1]. Excessive insulin secretion causes profound hypoglycemia and requires immediate treatment to prevent serious and irreversible brain damage [2].

Aim. Assess and analyze the causes, features of the clinical picture, diagnosis and timely care of newborns with hyperinsulinemic hypoglycemia.

Materials and methods. In the course of our research, the materials of a number of articles and research on this topic were analyzed and summarized. The authors describe clinical cases of congenital hyperinsulinism in newborns, where they pay attention to the history of the disease and timely diagnosis of this condition [3]. Molecular genetic mutations that lead to the disease are also studied and new, improved approaches to emergency care and treatment of hyperinsulinism are described [4].

Results and discussion. Insulin secretion by pancreatic β-cells is a consequence of increased levels of intracellular ATP. Dysfunction of ATP-dependent K-channels, as well as defects in the regulation of intracellular glucose metabolism can lead to the development of hyperinsulinemic hypoglycemic states. The most common cause of congenital hyperinsulinism (CHI) are mutations in the KCNJ11 and ABCC8 genes. Hyperinsulinism may also be associated with perinatal stress, such as

birth asphyxia, maternal toxemia, prematurity, or intrauterine growth retardation, leading to prolonged neonatal hypoglycemia [4].

CHI is associated with recessive mutations in the KCNJ11 and ABCC8 genes, is severe, has an early onset of hypoglycemia, and is generally not amenable to conservative therapy. Dominantly inherited forms are milder, manifest later, and are in most cases sensitive to diazoxide therapy [4].

CHI, as a rule, manifests itself in the neonatal period, but a later onset is possible, up to 3 years of age. The earlier the disease is detected, the more severe it is. Hypoglycemic condition CHI is usually severe and quickly leads to seizures and loss of consciousness. Due to the excessive production of insulin in the womb, children with CHI are usually born with excess body weight. At birth, macrosomia, cardiomyopathy, hepatomegaly are often detected. Mothers may experience excess weight gain during pregnancy. Hypoglycemia in infants, if not recognized, can lead to developmental delay and irreversible brain damage [2, 3].

Diagnosis of this condition includes determination of plasma insulin levels (more than 2.0 units / l) at the time of hypoglycemia (blood glucose <2.4 mmol / l in children older than 1 year and <2.2 mmol / l in children under one year). In addition, the criteria that confirm the diagnosis of CHI are hypoketonemic nature of hypoglycemia (absence of ketone bodies in the urine, low levels of 3-hydroxybutyrate in the blood), high or normal levels of C-peptide on the background of hypoglycemia, the need for high doses of glucose (> 8 mg / kg / min). It is also a molecular genetic study to determine gene defects that lead to CHI [3, 4].

Nowadays, diazoxide is the drug of choice for the treatment of hyperinsulinemic hypoglycemic conditions. Diazoxide is an agonist of ATP-dependent K-channels of pancreatic β-cells. One of the main problems is that most patients with recessively inherited mutations in the KCNJ11 and ABCC8 genes, as well as some mutations in the GCK gene, are resistant to this treatment. Therefore, second-line drug therapy for infants who do not respond to diazoxide is octreotide. If resistance remains and the state of hyperinsulinism persists and leads to deterioration of the patient's condition, it is an indication for surgery, namely subtotal

pacratectomy. This operation is extremely disabling, as in 40-50% of cases it leads to the development of insulin-dependent diabetes mellitus.

Conclusions. The problem of hyperinsulinism requires an interdisciplinary approach that includes pediatric endocrinologists, geneticists and surgeons. Timely diagnosis, selection of adequate treatment and dynamic monitoring can minimize neurological complications of hypoglycemic conditions. Despite the breakthrough in understanding the etiology and pathogenesis of CHi, in 50% of cases the molecular genetic diagnosis remains unclear, which requires further research in this area.

REFERENCES:

1. McQuarrie I. Idiopathic spontaneously occurring hypoglycemia in infants: clinical significance of problem and treatment. AMA Am J Dis Child 1954;87:399-428.
2. Arya VB, Senniappan S, Guemes M, Hussain K. Neonatal hypoglycemia. Indian J Pediatr. 2014; 81:58-65
3. DeLeón DD, Stanley CA. Mechanisms of disease: advances in diagnosis and treatment of hyperinsulinism in neonates. Nat Clin Pract Endocrinol Metab 2007;3:57-68.
4. Dekelbab BH, Sperling MA. Recent advances in hyperinsulinemic hypoglycemia of infancy. Acta Paediatr 2006;95:1157-1164.