

CLINICAL AND LABORATORY CHARACTERISTICS AND METABOLIC DETERMINANTS OF HYPOCALCEMIC CONVULSIVE SYNDROME IN YOUNG CHILDREN

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Abstract

The clinical and laboratory characteristics and its metabolic determinants, in which hypocalcemic convulsive syndrome occurs in young children, are one of the pressing issues in the framework of modern pediatric and neurological sciences. Hypocalcemia is a condition caused by a decrease in calcium levels in the blood, which can manifest mainly in acute and chronic forms in young children. This, in turn, affects the functioning of the central nervous system, leading to the appearance of clinical signs in the form of convulsions, that is, uncontrolled muscle contractions. Hypocalcemic convulsive syndrome is often associated with metabolic disorders, and its etiology, pathogenesis, clinical manifestations and coverage of diagnostic signs are of great importance in improving the health of young children.

Keywords: Syndrome, treatment, hyperexcitability, clinical manifestations, diagnosis, etiology, metabolic disorders, activity, system.

Introduction

Hypocalcemic convulsive syndrome in children is primarily caused by disturbances in calcium and phosphorus metabolism. Calcium is found in the body primarily in bones, and the normal development and maintenance of functional state are dependent on calcium balance. A decrease in calcium levels leads to hyperexcitability in the CNS, which manifests itself in the form of muscle spasms and convulsions. Hypocalcemia causes include insufficient calcium intake, vitamin D deficiency, metabolic disorders of the mother during pregnancy, internal organ disorders, including kidney disorders, and diseases of the endocrine glands. Early diagnosis and treatment of this condition in children is considered important because convulsions can lead to severe complications, including impaired myocardial function, shortness of breath, and even death. The clinical picture of hypocalcemic convulsive syndromes is variable in most cases, depending on the age of the children, the level of hypocalcemia, and the duration of the disease. In premature infants, this syndrome is more pronounced with muscle spasm, contraction of the arms and legs, facial congestion, difficulty breathing, and seizures-like conditions. In older children, symptoms such as nausea, dizziness, headache, nervousness, and insomnia are more



common. Convulsions also differ in duration and intensity, and sometimes they can last from a few minutes to tens of minutes. Parameters such as the general condition of the child, blood pressure, heartbeat and skin color and temperature should be monitored regularly.[1]

The role of laboratory studies is of great importance in the diagnosis of hypocalcemic syndrome. Biochemical analysis of blood determines calcium levels, especially ionized calcium, because it is directly involved in physiological activity in the body. Along with this, it is important to measure the level of phosphate, magnesium and vitamin D. Calcitonin and parathormone levels are also tested because they are important regulators in controlling the calcium-phosphorus balance. In hypocalcemia, there is often an increase in blood phosphate levels; this has a negative effect on bone mineralization. The ability of doctors to correctly assess laboratory results is an important factor in determining the treatment strategy. Metabolic determinants of hypocalcemic convulsive syndrome include, first of all, vitamin D deficiency. Vitamin D promotes the absorption of calcium and phosphorus in the body, and their deficiency causes bone weakness, rickets. A decrease in maternal vitamin D levels during pregnancy leads to impaired calcium metabolism in the baby. In addition, nutritional factors, such as a diet that is not rich in calcium, insufficient sunlight, partial internal diseases, are also responsible for metabolic disorders. Malfunctions in the functioning of impaired endocrine regulation – thyroid, parathormone and other hormones-also change the calcium background.[2]

In the first place in the treatment is the use of calcium and vitamin D. High concentrations of calcium solutions are used to normalize calcium levels, and activated forms are given to raise vitamin D levels. At the same time, it is important to correct nutrition and provide sun exposure to eliminate metabolic disorders. Extensive medical care is also required, as well as symptomatic therapy. Anticonvulsant medications may be used to stop the convulsions, but they cannot address the underlying problem of hypocalcemia. Therefore, treatment strategies must be tailored to the individual and require ongoing monitoring.[3]

Regular medical supervision is necessary to monitor the development of children and prevent recurrence of symptoms. Neurologists, pediatricians and endocrinologists work closely in this process. Such an approach will prevent complications, ensuring timely and correct treatment is carried out in the child. It is also important to educate families in depth about the problem and encourage them to follow the guidelines. The course of hypocalcemic convulsive syndrome in young children can lead to chronic and serious conditions, therefore, careful approach is required in diagnostic and therapeutic processes. In the Prevention of hypocalcemic convulsive syndrome, much attention is paid to preventive measures. It is very important to control the general health of pregnant women, meet their vitamin D and calcium needs, provide proper care for newborns. Also, the occurrence of hypocalcemia is obtained by maintaining the balance of nutrients in young children and regular monitoring of their growth process. It is known that in addition to early diagnosis and treatment, the formation of a healthy lifestyle is also necessary to reduce the recurrence of the phenomenon and prevent the disease from becoming chronic.[4]

In most cases, hypocalcemic convulsive syndrome requires a deep medical approach, since its results can affect children throughout their lives. Therefore, in such cases, long-term rehabilitation and social assistance should be created in medical institutions. It is also possible



to improve the effectiveness of the fight against hypocalcemic convulsive syndrome by improving the skills of medical personnel, developing scientific research in the field of Pediatrics and neurology. This serves to form a healthy generation.[5]

Treatment options in children with hypocalcemia include a number of important aspects, and their goal is to quickly and effectively restore calcium levels in the blood and eliminate metabolic disorders. As calcium deficiency leads to serious complications, including convulsions and muscle spasms, especially in young children, this problem requires rapid and precise treatment. In the first stage of treatment for hypocalcemia, therapy is aimed at increasing blood calcium concentrations. This therapy system is conducted using calcium preparations and various forms of vitamin D. Calcium preparations are one of the main agents in the elimination of hypocalcemia. Substances such as calcium gluconate, calcium chloride and calcium carbonate can be given to the body either orally or intravenously. Calcium gluconate in particular is widely used in rapid relief because it helps to quickly raise blood calcium levels. Initial doses of the drugs are usually determined by the weight and condition of the children, and blood calcium levels are systematically checked during therapy. It is never recommended to take calcium independently to avoid overdose, as excessive calcium accumulation can lead to specific complications. Vitamin D preparations also play an important role in regulating calcium metabolism. Active forms of Vitamin D, such as calcitriol or ergocalciferol, ensure good absorption of calcium and phosphorus by the body in the kidneys and liver cells. Especially when hypocalcemia is associated with vitamin D deficiency, these drugs have the maximum effect. Even when using them, the dosage and duration of use are determined by the doctor, since taking excess vitamin D can cause toxic symptoms. These drugs improve bone mineralization and reduce medical problems. It is also necessary to eliminate metabolic disorders that accompany hypocalcemia. The balance of potential calcium-bound elements, such as magnesium and phosphate, is very important in the blood. In case of magnesium deficiency, there is a violation in the absorption and activity of calcium. For this reason, magnesium preparations can also be included in the treatment protocol. In cases of high phosphate levels, measures are taken to reduce it, as high phosphate levels also contribute to bone weakness. Regular laboratory monitoring is required to identify and correct these metabolic factors, which increases the effectiveness of treatment. Symptomatic therapy is used to relieve convulsions and muscle spasms caused by hypocalcemia. Sometimes anticonvulsant drugs and muscle spasms reducing agents may be recommended in medicine. But their main task is only to control the symptoms, not directly affecting the disease itself.

For this reason, symptomatic therapy is seen as a complement to the basic course of treatment that eliminates calcium and vitamin D deficiency. During the treatment process, the condition of the children is kept under constant control. Nutrition is an important treatment factor. Increasing foods rich in calcium and vitamin D, as well as providing children with regular sunlight, contributes to the natural synthesis of these vitamins. In folk medicine, too, it was recommended to increase the effectiveness of therapy by natural methods. In order for children to consume enough milk and dairy products, parents and health professionals must provide constant advice. Because calcium deficiency is often associated with improper or inadequate nutrition.



Conclusion:

In conclusion, hypocalcemic convulsive syndrome in young children is a serious medical problem that needs to be accurately diagnosed through clinical manifestations and laboratory results. Metabolic determinants in it, specifically calcium and vitamin D deficiency, are of more primary importance than others. To prevent the consequences of the syndrome, it is important to take quick and correct treatment measures, as well as carry out preventive measures. This task requires a high level of medical and social attention, since it is precisely such problems that children lead a healthy and active life that depend on an effective solution. As a result, the chances of growing healthy offspring in our society increase significantly by improving the health of children and supporting their development.

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