

SIGNIFICANCE OF BONE TISSUE ORGANIC MATRIX BIOMARKERS IN ACUTE HEMATOGENOUS OSTEOMYELITIS IN CHILDREN

¹Musayev Sadiqjon Toirovich, ²Kim Oksana Vladislavovna

¹Assistant of the Department of Clinical Pharmacology, Samarkand State Medical University

²Assistant Professor of the Department of Biological Chemistry, Samarkand State Medical University

<https://doi.org/10.5281/zenodo.10688587>

Abstract. Hematogenous osteomyelitis is a purulent inflammation of the bone caused by the entry of microbes into the bloodstream from pustules on the skin, purulent wounds and inflammatory foci in various organs. On the first day, general signs of intoxication prevail: high fever, nausea, vomiting, shivering, weakness and headache. Then there is severe pain and significant swelling of the limb. Later, the pus penetrates the soft tissues, forms phlegmon, and can rupture the skin with the formation of a fistula. Diagnosis is based on symptoms and laboratory data. X-rays are informative only from the third week of the disease. Treatment - antibiotic therapy, detoxification therapy, opening and drainage of abscesses.

Keywords: causes, pathogenesis, symptoms of hematogenous osteomyelitis, diagnostics, treatment of hematogenous osteomyelitis.

Hematogenous osteomyelitis (blood from the Latin hematogenous, osteon bone + myelos bone marrow + itis inflammation) is a purulent process in bone tissue caused by a blood-borne infection. This type of osteomyelitis is a serious disease that mainly affects children and adolescents aged 7 to 15 years. Young children can also suffer. It is three times more common in boys than in girls. Adults rarely get sick. It begins acutely, but later sometimes becomes chronic and can last for many years - this is due to the presence of a certain number of adult patients with hematogenous osteomyelitis. Purulent inflammation can develop in any bone, but long tubular bones (humerus, femur, tibia) are most often affected. Hematogenous osteomyelitis is treated by orthopedic traumatologists. Hematogenous osteomyelitis and its reasons will be discussed below:

The most common causative agent of the disease is staphylococci. Less commonly, hematogenous osteomyelitis is caused by pneumococcus, streptococcus, and Escherichia coli. Before the onset of the disease, bacteremia (the presence of microbes in the blood), which can occur as a result of the presence of large purulent processes or small foci of infection (boils, suppurations, sores on the tonsils). with tonsillitis, purulent with acute otitis media). At the same time, experts in the field of traumatology emphasize that osteomyelitis can develop both against the background of an existing infection and after many months or even years have passed. The susceptibility of children to hematogenous osteomyelitis is explained by the structural characteristics of bones in childhood. In children, the metaphysis has a very extensive network of branched vessels with slow blood flow, which is due to the need to supply the area of bone growth with a large amount of nutrients. The vessels of the metaphysis do not communicate with the vessels of the epiphyseal cartilage, so many arterioles end blindly at the border of the metaphysis and the epiphysis, which creates favorable conditions for the retention of pathogenic

microorganisms. After entering this zone, microbes create pockets of dormant infection that can be activated when the body is weakened or slightly injured.

In about half of cases, hematogenous osteomyelitis occurs after a small injury (bruise), in which, according to researchers, previously introduced pyogenic microorganisms are released from a "dormant focus" and begin to multiply. As a result of their vital activity, a purulent focus is formed in the bone and general intoxication phenomena occur. Factors that reduce the body's resistance and contribute to the activation of microbes are infectious diseases of children, influenza and general hypothermia.

Pathogenesis

Initially, a small abscess forms in the bone marrow of the metaphyseal zone. Since the epiphyseal cartilage is very resistant, the pus spreads towards the diaphysis and destroys the bone marrow, thereby depriving the bone of its internal nutrition. Through the channels of Havers, pus penetrates under the periosteum and expels it from the bone, so the bone is deprived of nutrition from the outside. Deprived of nutrients, the bone is destroyed and an area of osteonecrosis is formed.

Toxins from the source of infection enter the surrounding tissues and are actively absorbed into the blood, which causes the development of rapid intoxication. And the high pressure of pus in the space limited by the medullary canal causes sharp, very intense pain. Later, the pus dissolves the periosteum and penetrates into the soft tissues, resulting in the formation of intermuscular phlegmon. When phlegmon occurs, a fistula appears on the skin.

Symptoms of hematogenous osteomyelitis

The septic-pyemic form of the disease is characterized by severe intoxication and rapid development of local changes. The disease begins when the temperature rises to 39-40 degrees. The patient's condition is characterized by severe, shivering, repeated vomiting and headache. Delirium and loss of consciousness are possible. Sometimes hemolytic jaundice is detected. On the second day, very strong, clearly localized pain and rapidly increasing swelling of soft tissues appear. Limbs are in a forced position; movements are impossible due to pain. The skin in the affected area is tense, local hyperemia and hyperthermia are noted.

Hematogenous osteomyelitis is often combined with arthritis of nearby joints. Analyzes reveal metabolic acidosis, hyponatremia, hypercalcemia, and hyperkalemia, as well as cyclic changes in the blood coagulation system: first hypercoagulation develops, then hypocoagulation and fibrinolysis. Liver and kidney function are impaired. With the development of sepsis, purulent foci are formed in various organs. Possible multiple bone lesions, purulent pericarditis or purulent destructive pneumonia. In the local form of hematogenous osteomyelitis, local symptoms predominate: pain, swelling and hyperemia of the limbs. The general condition is less painful than other forms, it can get a little worse, and sometimes it remains satisfactory. Toxic (adynamic) form is very rare. It is characterized by lightning-fast development and a very difficult course. On the first day, toxicosis increases with a sharp rise in temperature, the appearance of meningeal symptoms, a sharp drop in blood pressure, and the development of acute cardiovascular failure. There are convulsions and loss of erection, followed by adynamic. In the initial stages, local symptoms are mild, which greatly complicates the diagnosis.

Diagnostics

The diagnosis of hematogenous osteomyelitis is made by a specialist in traumatology and orthopedics based on the clinical picture and laboratory data showing an acute infectious process.

If there is a suspicion of disruption of the functioning of internal organs and the spread of infection, consultations with relevant specialists are prescribed: pulmonologist, gastroenterologist, nephrologist. Depending on the location, radiography of the femur, radiography of the humerus, etc. are performed. Over time, the X-ray examination is repeated, because there are no changes in the X-ray images in the early stages of the disease. About two weeks after the onset of the disease, the images show signs of periostitis, and a little later, signs of rubbing and thinning of the cancellous bone in the metaphysis begin to appear. 2-4 months after the onset of the first symptoms, sequestration is detected on X-rays. To determine the location of sequestrations, fistulas and cavities, fistulography, radiothermia, MRI of the bone and ultrasound examination of the affected segment are performed.

Treatment of hematogenous osteomyelitis

Treatment is carried out in the trauma department. Intramuscular and intravenous injections of semi-synthetic penicillins, cephalosporins or lincomycin are prescribed to fight infection. In some cases, early initiation of antibiotic therapy allows stopping the development of the inflammatory process and eliminating the purulent focus before bone destruction and sequestration begin. At the same time, detoxification therapy is carried out using plasma, blood substitutes and crystalloid solutions. Symptomatic drugs are prescribed. Local treatment includes immobilization of the affected limb. When an abscess appears in the area of the metaphysis or diaphysis, a hole is opened in the bone where the folds are formed, and drainage is carried out through the stream. Intermuscular phlegmons are widely opened and drained. Antibiotics are injected into the cavities of the abscesses, which are located in the bones and soft tissues. In the postoperative period, antibiotic therapy and detoxification therapy are carried out. Immobilization is continued until the inflammation completely disappears.

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