LABORATORY DIAGNOSIS OF IRON DEFICIENCY ANEMIA.

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Abstract:
Iron deficiency anemia (IDA) accounts for approximately 90% of all anemia cases. According to the World Health Organization, one in six men and one in three women in the world suffer from this form of anemia. Hemoglobin is a complex protein compound that reacts with oxygen molecules and contains iron trace elements, it is the basis of the transport of oxygen from the lungs to the tissues and vice versa, carbon dioxide from the tissues to the lungs in the body.

Keywords: hypochromic anemia, metabolic processes, nutrient exchange, carbon dioxide.

Iron deficiency anemia is a hypochromic anemia, which is observed along with the symptoms of microcytosis, because the iron element necessary for the normal development of hemoglobin, which gives the size and color to the erythrocyte, is lacking.Iron is an important trace element related to many metabolic processes, nutrient exchange, and gas exchange in the body. During the day, adults consume 20-25 mg of iron, the total reserve of this element in the body is about 4 g.

How Is Iron-Deficiency Anemia Diagnosed? Iron-deficiency anemia is diagnosed by blood tests that should include a complete blood count (CBC). Additional tests may be ordered to evaluate the levels of serum ferritin, iron, total iron-binding capacity, and/or transferrin.

Different types of iron tests include: Serum iron test, which measures the amount of iron in the blood. Transferrin test, which measures transferrin, a protein that moves iron throughout the body. Total iron-binding capacity (TIBC), which measures how well iron attaches to transferrin and other proteins in the blood. The laboratory evaluation of anemia begins with a complete blood count and reticulocyte count. The anemia is then categorized as microcytic, macrocytic or normocytic, with or without reticulocytotic. Examination of the peripheral smear and a small number of specific tests confirm the diagnosis. The serum iron level, total iron-binding capacity, serum ferritin level and hemoglobin electrophoresis generally separate the microcytic anemias. The erythrocyte size-distribution width may be particularly helpful in distinguishing iron deficiency from thalassemia

minor. Significant changes have occurred in the laboratory evaluation of macrocytic anemia, and a new syndrome of nitrous oxide-induced megaloblastosis and neurologic dysfunction has been recognized. A suggested approach to the hemolytic anemias includes using the micro-Coombs' test and ektacytometry. Finally, a number of causes have been identified for normocytic anemia without reticulocytosis, including normocytic megaloblastic anemia and the acquired immunodeficiency syndrome. The reasons for the development of this type of pathology include various etiological factors.

Decreased appetite due to unstable diet, insufficient intake of iron, hunger, diets, medications, drugs and other substances that suppress the feeling of hunger, physical or mental diseases;

Disturbances in absorption of iron during absorption:

- diseases of the gastrointestinal tract (gastritis, colitis, peptic ulcer, resection of this organ).
- imbalance in consumption and use of iron according to the body's high needs:
- pregnancy, breastfeeding;
- puberty in physical growth;
- chronic diseases that cause hypoxia (bronchitis, obstructive pulmonary disease, heart disease, cardiovascular system and other diseases of the respiratory system);

Diseases with necrotic processes: sepsis, tissue abscesses, bronchoectatic disease, etc.

With bleeding in the lungs (pulmonary tuberculosis, tumor formation);

- bleeding in the gastrointestinal tract - peptic ulcer, duodenal ulcer, stomach and intestinal cancer, erosion of the gastrointestinal mucosa, varicose veins of the esophagus and rectum, hemorrhoids, intestinal worms presence, ulcerative colitis, etc.;
- bleeding from the uterus (heavy menstruation, cancer of the uterus and cervix, myoma, ectopic pregnancy, injuries of the uterus and cervix during childbirth);
- bleeding in the kidneys (appearance of a tumor in the kidney, tuberculosis of the kidneys);
- bleeding — blood loss, including hidden and internal, as a result of injuries, burns, frostbite, planned and emergency surgical procedures.

The clinical picture of anemia developed due to iron deficiency is primarily anemic and sideropenic syndrome due to impaired gas exchange in body tissues.
General weakness, chronic fatigue;

- weakness, inability to withstand prolonged physical and mental stress;
- lack of attention, difficulty concentrating, rigidity;
- irritation;
- headache;
- sometimes fainting;
- drowsiness and sleep disorders;
- shortness of breath, increased heart rate during physical and/or psychoemotional stress, as well as at rest;

Black color of feces (associated with bleeding in the gastrointestinal tract).
The laboratory evaluation of anemia begins with a complete blood count and reticulocyte count. The anemia is then categorized as microcytic, macrocytic or normocytic, with or without reticulocytotic. Examination of the peripheral smear and a small number of specific tests confirm the diagnosis.
The diagnosis of iron-deficiency anemia is based on visual examination, instrumental examinations of the patient, and evaluation of the results of laboratory blood analysis.
In addition to physical examination and patient history, attention is paid to the condition of the skin, the mucous membrane of the mouth, the corners of the lips, and the size of the spleen is assessed by palpation.
The general analysis of blood shows a decrease in the amount of erythrocytes and hemoglobin, erythrocytes of different sizes (poikilocytosis), and microstitis compared to age and gender norms in the clinical picture of TTA. In severe cases of anemia, erythrocytes smaller than 7.2 μm are found in the blood, hypochromic, weak color of erythrocytes, low color index is determined.
The results of a biochemical blood test for iron deficiency anemia have the following indicators:

- low concentration of ferritin protein, which acts as a reserve of iron in the body;
- low level of serum iron;
- increased serum iron binding capacity.

The diagnosis of TTA is not limited to the detection of iron deficiency. For the correct treatment of this condition, the specialist prescribes auxiliary instrumental

analyzes in order to clarify the pathogenesis of the disease. Instrumental studies in this case include:

- fibrogastroduodenoscopy - study of the condition of the esophagus, stomach wall, duodenal mucosa;
- ultrasound examination of the liver, kidneys, reproductive organs of women;
- colonoscopy, examination of the walls of the small intestine;
- computed tomography methods;
- x-ray of the lungs.

Sometimes it is difficult to diagnose the cause of iron deficiency, or your doctor may be concerned that there is a problem other than iron deficiency causing the anemia. These may include inherited blood disorders called thalassemia sin which red blood cells also appear small and pale, hemoglobinopathies such as sickle cell disease (but not sickle cell trait alone), or other blood disorders. People with chronic infections or conditions such as kidney failure, autoimmune diseases, and inflammatory disorders may also have small red blood cells. When the cause of the anemia is not clear, your doctor may refer you to a hematologist, a medical specialist in blood disorders, for consultation and further evaluation.

The amount of iron needed to treat patients with iron deficiency is higher than the amount found in most daily multivitamin supplements. The amount of iron prescribed by your doctor will be in milligrams (mg) of elemental iron. Most people with iron deficiency need 150-200 mg per day of elemental iron (2 to 5 mg of iron per kilogram of body weight per day). Ask your doctor how many milligrams of iron you should be taking per day. If you take vitamins, bring them to your doctor's visit to be sure.

There is no evidence that any one type of iron salt, liquid, or pill is better than the others, and the amount of elemental iron varies with different preparations. To be sure of the amount of iron in a product, check the packaging. In addition to elemental iron, the iron salt content (ferrous sulfate, fumarate, or gluconate) may also be listed on the package, which can make it confusing for consumers to know how many tablets or how much liquid to take to get the proper dosage of iron.

Iron is absorbed in the small intestine (duodenum and first part of the jejunum). This means that enteric-coated iron tablets may not work as well. If you take antacids, you should take iron tablets two hours before or four hours after the antacid. Vitamin C (ascorbic acid) improves iron absorption, and some doctors

recommend that you take 250 mg of vitamin C with iron tablets. To determine the diagnostic values of laboratory tests used in the diagnosis of iron-deficiency anemia, the authors conducted a systematic overview of the relevant literature. Computerized searches of the MEDLINE database yielded 1,179 potentially relevant citations. Fifty-five studies included the results of laboratory tests and histologic examination of the bone marrow for at least 50% of an identifiable patient group. In these 55 studies, quality was assessed and descriptive information concerning the study populations, the tests conducted, and the results was extracted, all in duplicate. Serum ferritin radioimmunoassay was by far the most powerful test, with an area under the receiver operating characteristic curve of 0.95. Test properties differed for populations of patients with inflammatory, liver, or neoplastic disease and patients without these conditions. Likelihood ratio lines, which allow precise interpretation of results across the entire range of ferritin concentration values, were constructed for the individual populations. Serum ferritin radioimmunoassay is an extremely powerful test for the diagnosis of iron-deficiency anemia and, appropriately interpreted, can be applied to the complete range of patients.

In some cases your doctor may recommend intravenous (IV) iron. IV iron may be necessary to treat iron deficiency in patients who do not absorb iron well in the gastrointestinal tract, patients with severe iron deficiency or chronic blood loss, patients who are receiving supplemental erythropoietin, a hormone that stimulates blood production, or patients who cannot tolerate oral iron. If you need IV iron, your doctor may refer you to a hematologist to supervise the iron infusions. IV iron comes in different preparations:

Large doses of iron can be given at one time when using iron dextran. Iron sucrose and ferric gluconate require more frequent doses spread over several weeks. Some patients may have an allergic reaction to IV iron, so a test dose may be administered before the first infusion. Allergic reactions are more common with iron dextran and may necessitate switching to a different preparation. Severe side effects other than allergic reactions are rare and include urticaria (hives), pruritus (itching), and muscle and joint pain.

Background and methods: To determine the diagnostic values of laboratory tests used in the diagnosis of iron-deficiency anemia, the authors conducted a systematic overview of the relevant literature. Computerized searches of the MEDLINE database yielded 1,179 potentially relevant citations. Fifty-five studies included the results of laboratory tests and histologic examination of the bone

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Современные аспекты по улучшению качества ведения больных с патологией эндокринных органов в условиях первичного звена медицинской помощи // Достижения науки и образования. 2019. №10 (51). URL: https://cyberleninka.ru/article/n/sovremennye-aspekty-po-uluchsheniyu-kachestva-vedeniya-bolnyh-s-patologiey-endokrinnyh-organov-v-usloviyah-pervichnogo-zvena

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