LEUKEMOID REACTIONS AND LEUKEMIAS DIFFERENTIAL DIAGNOSIS

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Leukemoid reactions are a protective reaction of the body and are characterized by the appearance of immature blood cells due to non-neoplastic processes. Leukemoid reactions are not independent diseases. Differentiation of leukemias from leukemoid reactions is necessary due to the specific development of neoplastic leukemia associated with the appearance of anemia and thrombocytopenia, which is not observed in leukemoid reactions caused by underlying diseases.

Leukemoid reactions can be classified into the following types:

1. Lymphocytic.
2. Monocytic.
3. Myeloid (neutrophil, eosinophil, basophil).

Leukemoid reaction of the neutrophil type

Leukemoid reaction of the neutrophil type is similar to chronic myeloid leukemia or idiopathic myelofibrosis.

Myeloid leukemoid reaction is characterized by the following:

1. Marked leukocytosis.
2. Appearance of metamyelocytes, myelocytes, and promyelocytes in the blood.
3. Appearance of normocytic erythrocytes in the blood.
4. Increase in granulocytic series cells - metamyelocytes, myelocytes, and promyelocytes in the bone marrow.

Myeloid leukemoid reaction occurs in the following conditions:

1. Bacterial infections with severe inflammation.
2. Severe conditions, including osteomyelitis.
3. Septic states.
4. Severe exogenous and endogenous intoxications (uremia, diabetic ketoacidosis, coma).
5. Rheumatism.
6. Severe hemolysis.
7. Tissue fragmentation and necrosis (myocardial infarction).
8. Foodborne toxic infections.
9. High doses of steroid hormones, cytostatic, insulin.
10. Severe blood loss.
11. Neoplastic diseases (malignant tumors).
12. Advanced liver disease.

Differential diagnosis of myeloid leukemoid reactions is performed with chronic myeloid leukemia (Table 1).

Table 1. Laboratory differentiation of myeloid leukemoid reaction and chronic mieloleycosis

Cytologicalindicator	Myeloid type leukemoid reaction	Chronic myeloleycosis
The exact cause of myelositosis	Available	Not available
Blood metamyelocytes, myelocytes and promyelocytes	Available	Available
Normochromic anemia	Not available	Available
Platelets	Normally	thrombocytosis in 40%, thrombocytopenia in 30%
Leukocytes	Leukocytosis 10-100h10^9/ly	Hyperleycocytosis 50-1000h10^9/ly
Blasts	Not available	Available
Stick-core neutrophils	Increased	Increased
Segment core neutrophils	Increased	Decreased
Eosinophilic - baseline association (increase)	No	Bow
Toxin Grain	Bow	No
Atypia of cells	Not specified	Detected
Myeloid hyperplasia of the bone marrow	Not specified	Detected
Philadelphia chromosome in blood cells	Not specified	Detected
Against the background of antibacterial therapy	Changes in blood completely disappear	Changes in the blood will not disappear

Different from chronic myeloid leukemia, reactive leukocytosis is always based on a severe process associated with an increase in body temperature. The increase in neutrophil granulocyte production is related to the overall activation of microbial bodies, destruction of thrombocytes, and the entry of endotoxins and exotoxins.

Leukemoid reaction of the eosinophil type.

The myeloid eosinophilic leukemoid reaction is characterized by an increase in eosinophils by 20-90%, with the presence of young eosinophils such as eosinophil metamyelocytes, myelocytes, and promyelocytes.

Eosinophilic leukemoid reaction occurs in the following pathologies:

1. Allergic reactions.
2. Parasitic invasions.
3. Immunopathological diseases (rheumatoid arthritis, Crohn's disease, non-specific ulcerative colitis, etc.).
4. Hemoblastosis and other neoplasms (chronic myelogenous leukemia, lymphogranulomatosis, lymphomas, etc.).
5. Eosinophilic infiltrates, bronchial asthma.
6. Quincke's angioedema.
7. Dermatoses.

8. After burns, etc.

In lymphogranulomatosis, a high eosinophilia with retroperitoneal lymph nodes, spleen, and inguinal lymph node involvement serves as a prognostically unfavorable sign.

Eosinophilic leukemoid reaction is differentially diagnosed with eosinophilic chronic myeloid leukemia. To do this, the eosinophil count is calculated based on 100 cells. If the eosinophil gram shows a predominance of mature and segmented eosinophils, it is considered an eosinophilic leukemoid reaction. In chronic myeloid leukemia, the eosinophil gram shows a predominance of eosinophil metamyelocytes, myelocytes, and promyelocytes.

Lymphocytic leukemoid reaction.

The lymphocytic leukemoid reaction resembles chronic lymphocytic leukemia. The following types of lymphocytic leukemoid reactions are present:

1. Infectious lymphocytosis

- Viral infections (influenza, parainfluenza, measles, viral hepatitis, infectious mononucleosis, etc.).
- Specific infections (syphilis, sarcoidosis, tuberculosis).
- Bacterial infections (pertussis, syphilis, etc.).
- Simple animal invasions (toxoplasmosis, glandular fever).

2. Reactive lymphocytosis

- Cardiac vascular insufficiency (reactive cardiac vascular insufficiency, myocardial infarction, septic shock).
- Lymphocytosis under the influence of medicinal substances.
- Allergic reactions.
- After major surgery.
- After an epileptic seizure.
- Severe injuries.

3. Chronic lymphocytosis

- Accumulative autoimmune diseases (rheumatoid arthritis).
- Tumors.
- Chronic inflammatory diseases.
- Splenic infarction.

Lymphocytic leukemoid reaction is differentiated from myeloid lymphocytic leukemia (Table 2).

Table 2. Lymphoid leukemoid reaction and chronic lymphocytosis laboratory differentiation

Cytologicalindicator	Lymphoid type leukemoid reaction	Chronic lymphocycosis
The exact cause of myelositosis	Available	Not available
Absolute lymphocytosis	Available	Available
Normochromic anemia	Not available	Available
Platelets	Normally	Thrombocytopenia

Leukocytes	Leukocytosis 10-100h10^9/ly	Hyperleycocytosis 50-600h10^9/ly
Blasts	Not available	Available
Prolymphocytes occur in the blood	Bow	Bow
Neutrophils with stick and segment core	Decreased	Decreased
Ridel Cells	Not specified	Detected
Gumprext shadows	Not specified	Detected
Atypia of cells	Not specified	Detected
Bone marrow lymphocystgiperplasia	Not specified	Detected
Against the background of etiopathogenetic therapy	Changes in blood completely disappear	Changes in the blood will not disappear

Monocyte leukemoid reaction

Monocytic occur due to the same etiological factors. Monocytic-type leukemoid reaction is differentiated from chronic monocytic leukemia (see Table 3) over a period of several years when reactive monocities remains asymptomatic. The main signs of the underlying disease are present in reactive monocities. A prolonged increase in monocytes, which is considered an indication for sternal puncture and trepan biopsy, is observed. In the case of chronic monocytic leukemia, monocytic cells are detected by their almost complete replacement of bone marrow with hyperplasia of granulocytes and erythrocytes. Hematopoietic cell and tissue ratios are normal in reactive monocities.

In infectious mononucleosis, an increase in the number of monocytes is observed, sometimes mimicking acute leukemia. The final diagnosis is made by dynamically monitoring blood tests and using PCR diagnostics for Epstein-Barr virus. In infectious mononucleosis, large plasma cells transform into plasmacytoid cells, and chromatin of nuclei becomes more homogeneous. In acute leukemia, the number of blast cells in the blood rapidly increases. In all cases, blood transfusions should be avoided until the disease is fully diagnosed, and the use of cytostatic and prednisolone is not recommended.

Treatment is carried out based on the main diagnosis. According to the guidelines, adequate therapy allows normalization of blood tests. Consultation with a hematologist is necessary in cases with long-term pathological changes in the leukocyte formula.

Monocytic leukemoid reaction and monocities share the same etiological factors. Monocytic-type leukemoid reaction is differentiated from chronic monocytic leukemia (see Table 3).

Table 3. Monocytic leukemoid reaction and chronic monocytic leukemia laboratory differentiation

Cytological indicator	Monocycle leukemoidreacsia	Chronic monocytic leukemia
The exact cause of monocities	Available	Note available

Absolute monocities	Available	Available
Normochromic anemia	Note available	Available
Platelets	Normally	Thrombocytopenia
Leukocytes	Leukocytosis 10-100h10^9/ly	Hyperleycocytosis 50-600h10^9/ly
Blasts	Note available	Available
The appearance of promonocytes in the blood	Bow	Bow
Neutrophils with stick and segment core	Decreased	Decreased
Atypia of cells	Specified	Detected
Bone marrow hyperplasia	Specified	Detected
Against the background of etiopathogenetic therapy	Changes in blood completely disappear	Changes in the blood will not disappear, will be progressive zed

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