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Pathogenesis, Origin and Prevention of Chronic Leukemia

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Abstract: Chronic leukemia is a primary tumor disease of the hematopoietic system, the substrate of which is immature and immature cells of the myeloid or lymphoid lineage. Various forms of chronic leukemia occur with a predominance of intoxication (weakness, arthralgia, ossalgia, anorexia, weight loss), thrombohemorrhagic (bleeding, thrombosis of various localization), lymphoproliferative syndromes (enlarged lymph nodes, splenomegaly, etc.). Of decisive importance in the diagnosis of chronic leukemia is the study of a complete blood count, bone marrow biopsy and lymph nodes. Treatment of chronic leukemia is carried out using chemotherapy, radiation therapy, immunotherapy, and bone marrow transplantation is possible.

Keywords: Causes, Risk factors, Pathogenesis, Classification, Chronic leukemia symptoms, Chronic myeloid leukemia, Chronic lymphocytic leukemia, Complications, Diagnostics, Chronic leukemia treatment, Prognosis.

Introduction: Chronic leukemia is a chronic lymphoproliferative and myeloproliferative disease characterized by an excessive increase in the number of hematopoietic cells that retain the ability to differentiate. In contrast to acute leukemia, where there is an increase in poorly differentiated hematopoietic cells, in chronic leukemia the tumor substrate is represented by mature or immature cells. All types of chronic leukemia are characterized by a long-term stage of benign monoclonal tumor.

Chronic leukemia mainly affects adults aged 40-50 years; Men are more often ill. Chronic lymphocytic leukemia accounts for about 30% of cases, chronic myeloid leukemia - 20% of all forms of leukemia. Chronic lymphocytic leukemia is diagnosed in hematology 2 times more often than chronic myelogenous leukemia. Leukemia in children occurs in a chronic form extremely rarely - in 1-2% of cases.

Research methods and materials: The true causes leading to the development of chronic leukemia are unknown. Currently, the viral-genetic theory of hemoblastoses has received the greatest recognition. According to this hypothesis, some types of viruses (including the Epstein-Barr virus, retroviruses, etc.) can penetrate immature hematopoietic cells and cause them to divide unhindered.

The role of heredity in the origin of leukemia is undeniable, since the disease is known to often run in families. In addition, chronic myelogenous leukemia is associated in 95% of cases with an abnormality of chromosome 22 (Philadelphia or Ph chromosome), in which part of its long arm is translocated to chromosome 9.

The most important predisposing factors for various types and forms of chronic leukemia affect the body:

a. high doses of radiation;

b. X-ray radiation;

c. industrial chemical hazards (varnishes, paints, etc.);

d. medicinal products (gold salts, antibiotics, cytostatics);

e. a long history of smoking.

The risk of developing chronic lymphocytic leukemia increases with long-term exposure to herbicides and pesticides, and chronic myeloid leukemia increases with radiation exposure.

Immunological mechanisms play an important role in the pathogenesis of chronic lymphocytic leukemia - this is evidenced by its frequent association with autoimmune hemolytic anemia and thrombocytopenia, collagenoses. However, in the majority of patients with chronic leukemia, it is not possible to identify the causative factors.

Depending on the origin and cellular substrate of the tumor, chronic leukemias are divided into:

Lymphocytic: chronic lymphocytic leukemia, Sézary's disease (cutaneous lymphomatosis), hairy cell leukemia, paraproteinemic hemoblastoses (myeloma, Waldenstrom's macroglobulinemia, light chain diseases, heavy chain diseases).

Myelocytic (granulocytic): chronic myelogenous leukemia, erythremia, polycythemia vera, chronic erythromyelosis, etc.

Monocytic: chronic monocytic leukemia and histiocytosis.

In its development, the tumor process in chronic leukemia goes through two stages: monoclonal (benign) and polyclonal (malignant). The course of chronic leukemia is conditionally divided into 3 stages: primary, advanced and terminal.

Results: In the early stage of chronic myelogenous leukemia, clinical manifestations are absent or nonspecific; hematological changes are detected incidentally during blood tests. In the preclinical stage, weakness, adynamia, sweating, subfebrile temperature, and pain in the left hypochondrium may increase.

The transition of chronic myeloid leukemia to the advanced stage is characterized by progressive hyperplasia of the spleen and liver, anorexia, weight loss, severe bone pain and arthralgia. The formation of leukemia infiltrates on the skin, mucous membranes of the oral cavity (leukemic periodontitis) and in the gastrointestinal tract is characteristic. Hemorrhagic syndrome is manifested by hematuria, menorrhagia, metrorrhagia, bleeding after tooth extraction and bloody diarrhea. In case of secondary infection (pneumonia, tuberculosis, sepsis, etc.), the temperature curve is linear.

The terminal stage of chronic myeloid leukemia occurs with a sharp exacerbation of all symptoms and severe intoxication. During this period, a difficult to treat and life-threatening condition - blast crisis - may develop, in which, due to a sharp increase in the number of blast cells, the disease may resemble acute leukemia. Blast crisis is characterized by aggressive symptoms: skin leukemia, severe bleeding, secondary infections, high fever, and possible rupture of the spleen.

Discussion: For a long time, the only sign of chronic lymphocytic leukemia may be lymphocytosis up to 40-50%, a slight increase in one or two groups of lymph nodes. In the advanced stage, lymphadenitis takes a generalized form: not only peripheral, but also mediastinal, mesenteric and retroperitoneal nodes enlarge. Splenomegaly and hepatomegaly appear; with the development of jaundice, compression of the common bile duct by enlarged lymph nodes, as well as the development of swelling of the neck, face and hands, the superior

vena cava (SVC syndrome) is possible. I am worried about constant ossalgia, itching of the skin and recurrent infections.

The severity of the general condition of patients with chronic lymphocytic leukemia is associated with the development of intoxication (weakness, sweating, fever, anorexia) and anemia syndrome (dizziness, shortness of breath, palpitations, fainting).

The terminal stage of chronic lymphocytic leukemia is characterized by the addition of hemorrhagic and immunodeficiency syndromes. During this period, severe intoxication develops, hemorrhages under the skin and mucous membranes, bleeding from the nose, gums, and uterus are observed.

Immunodeficiency, which occurs as a result of the inability of functionally immature leukocytes to perform their protective functions, is manifested by a syndrome of infectious complications. Patients with chronic lymphocytic leukemia often have pulmonary infections (bronchitis , bacterial pneumonia , tuberculous pleurisy), fungal lesions of the skin and mucous membranes, abscesses and phlegmon of soft tissues , pyelonephritis , herpes infection and sepsis .

Dystrophic changes in internal organs, cachexia and renal failure increase. Death from chronic lymphocytic leukemia occurs due to severe infectious and septic complications, bleeding, anemia and exhaustion. Chronic lymphocytic leukemia can transform into acute leukemia or lymphosarcoma (non-Hodgkin lymphoma).

The presumptive diagnosis is made on the basis of a complete blood count (CBC), the results of which should prompt a referral to a hematologist. To confirm the diagnosis, the following steps are taken:

Complete blood count. Typical changes for chronic myeloid leukemia include: anemia, the presence of single myeloblasts and granulocytes in various stages of differentiation; During the blast crisis, the number of blast cells increases by more than 20%. In chronic lymphocytic leukemia, the defining hematological signs are leukocytosis and lymphocytosis, the presence of lymphoblasts and Botkin-Gumprecht cells.

Punctures and biopsies. To determine the morphology of the tumor substrate, sternal puncture, trephine biopsy, and lymph node biopsy are indicated. In chronic myelogenous leukemia, bone marrow puncture shows an increase in the number of myelokaryocytes due to immature cells of the granulocytic lineage; Trephine biopsy reveals the replacement of adipose tissue with myeloid tissue. In chronic lymphoid leukemia, the myelogram is characterized by a sharp increase in lymphocytic metaplasia.

Instrumental research. To assess the severity of lymphoproliferative syndrome, ultrasound of the lymph nodes, spleen, chest X-ray, lymphoscintigraphy, MSCT of the abdominal cavity and a number of other methods are used.

In the initial preclinical stage, treatment is ineffective, so patients are under dynamic observation. General regimen measures include the exclusion of physical overload, stress, insolation, electrical procedures and heat therapy; a full-fledged diet rich in vitamins, long walks in the fresh air.

In the advanced stage of myeloid leukemia, chemotherapeutic treatment is prescribed (busulfan, mitobronitol, hydroxyurea, etc.); in case of severe splenomegaly, irradiation of the spleen is performed. Although this tactic does not lead to a complete cure, it significantly slows down the progression of the disease and allows you to delay the onset of a blast crisis. In addition to drug therapy, leukapheresis procedures are used for chronic myeloid leukemia. In some cases, a cure is achieved through bone marrow transplantation.

Conclusion: When chronic myelogenous leukemia progresses to the terminal stage, high-dose polychemotherapy is prescribed. Patients with chronic myelogenous leukemia live an average of 3-5 years after diagnosis, and in some cases 10-15 years. Cytostatic therapy (chlorbutin,

cyclophosphamide) is also used, sometimes in combination with steroid therapy, radiation to the lymph nodes, spleen, and skin. If the spleen is significantly enlarged, splenectomy is performed. Stem cell transplantation is used, but its effectiveness still needs to be confirmed.

The life expectancy of patients with chronic lymphocytic leukemia can range from 2-3 years (in severe, steadily progressing forms) to 20-25 years (with a relatively favorable course).

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