Oncology, Nuclear Medicine and Transplantology
(eISSN 3105-8760)

Conference Abstract A25

Features of Cardiac Hemodynamics and Blood Gas Composition Correction in Patients with CML. Respiratory Intensive Therapy. Literature Review and A Clinical Case

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Proceedings of III International Scientific and Practical Conference "Current Issues of Bone Marrow Transplantation and Hematology", October 11-12, 2025, Astana, Kazakhstan

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Relevance

Chronic myeloid leukemia (CML) is a rare type of blood cancer characterized by uncontrolled proliferation of leukocytes of a specific form. In CML, genetic mutations occur in hematopoietic stem cells of the bone marrow: a shortened chromosome 22 is detected in the genome of leukemic cells in almost all patients with CML. This abnormal chromosome was first described by researchers in the United States and named after the place where it was discovered — the Philadelphia chromosome.

CML is often detected incidentally during a blood test, since the disease develops asymptomatically. The goal of drug therapy is to maintain CML in the chronic phase, which allows patients to achieve almost the same life expectancy as healthy individuals. Thanks to new treatment methods, life expectancy in CML patients is steadily increasing, and therefore the number of patients with CML is also growing.

Treatment of CML requires special expertise and should be carried out in close collaboration with specialized centers. In cases of complications, treatment in the intensive care unit (ICU) by intensivists is required to correct metabolic disturbances at the level of the acid–base balance of the blood.

Objective of the study

To identify the features of hemodynamic disorder correction and to develop a management algorithm for patients with CML.

Materials and methods

The study was based on the results of examination and treatment of 25 CML patients from October 10, 2023, to April 20, 2024, who were in critical condition with hemodynamic and respiratory disorders, aged 20–45 years. Diagnostic criteria in this patient category included echocardiography and hemodynamic data.

Results

In one case, echocardiography revealed cardiac tamponade with accumulation of pericardial fluid and progression of severe heart failure.

In another case, a patient with bilateral pneumonia demonstrated, on chest MSCT and echocardiography, pronounced hydropericardium up to 500 ml, bilateral hydrothorax, ascites, and hepatosplenomegaly.

On average, patients stayed in the ICU for 14 days, where they received intensive therapy. Most patients were admitted in extremely severe condition: the severity was due to grade II respiratory failure, dyspnea, arterial hypoxemia (SpO_2 88%), tachypnea, respiratory rate of 28/min, and markedly reduced breath sounds bilaterally on auscultation.

Drug therapy included vasopressor and inotropic agents, non-invasive ventilation "CPAP," and oxygen therapy administered for arterial hypoxemia and respiratory alkalosis using different ventilation modes. In acute left ventricular failure, echocardiography revealed decreased cardiac volumes — EDV, ESV, and left ventricular ejection fraction, as well as ECG changes with sinus tachycardia. Positive dynamics were observed in 9 patients under cardiotonic support.

Conclusions

A practical-tactical algorithm was developed for ICU conditions: comprehensive monitoring of the cardiovascular system, early detection of risk factors, intensive therapy, reduction of the need for cardiotonic drugs, use of CPAP as supportive ventilation without transition to invasive mechanical ventilation in the absence of profound hypoxia or worsening ARF, and prevention of sepsis and multiple organ failure.

Thus, hemodynamic, respiratory, and acid–base disturbances lead to the development of such vital complications as pulmonary edema and acute left ventricular failure.

Non-invasive respiratory support in CPAP mode, combined with adequate intensive therapy, pharmacotherapy, and surgical methods, allows rapid stabilization of clinical condition, respiratory status, and hemodynamics in patients with left and right ventricular failure in CML.

It was determined that the use of the developed strategy for correction of hemodynamic disorders and respiratory therapy in complicated CML is optimal, reducing the risk of complications and lowering mortality.