A Case Report: Morfologi Acute Myeloid Leukemia (AML)

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Abstract: *Leukemia can occur acutely or chronically depending on how quickly the disease appears and progresses. Acute Myeloid Leukemia (AML) is one of the blood cancers characterized by malignant transformation and impaired differentiation of progenitor cells of the myeloid series. The incidence of AML is quite rare but is one of the biggest contributors to cancer deaths. LMA also has a direct impact on increasing the risk of diabetes, therefore it is necessary to have proper treatment and controlled blood sugar. We present here a case of Acute Myeloid Leukemia with Diabetes Mellitus and an overview of treatment strategies.*

Keywords: acute myeloid leukemia, cancer, diabetes mellitus

1. Introduction

Leukemia is a malignant disease of blood cells originating from the bone marrow, characterized by the proliferation of white blood cells, with the manifestation of abnormal cells in the peripheral blood. Leukemia itself can occur acutely or chronically depending on how quickly the disease appears and develops. Acute Myeloid Leukemia (AML) is one of the blood cancers characterized by malignant transformation and impaired differentiation of progenitor cells of the myeloid series. If not treated, this disease will cause death quickly within a few weeks to months after diagnosis[1].

The incidence of AML is quite rare but is one of the biggest contributors to cancer deaths. The incidence of AML for all ages in the world is 3.7 per 100,000 population per year. The incidence rate increased to 4 per 100,000 population per year based on the number of cases and deaths in 2008 – 2012. It is estimated that in 2015 there will be around 20,830 new cases of AML worldwide[2].

Although AML can occur in all age groups, AML is a common form of acute leukemia in adults, its incidence is increasing with increasing age and only a small percentage (10-15%) of leukemia occurs in childhood[3,4]. The median age of AML patients in the United States is 67 years[5]. For the incidence by gender, in a study in America it was found that the prevalence of AML in men aged >65 years was higher than women >65 years. However, no difference in incidence by sex was found in younger patients [6,7].

The main pathogenesis of LMA is the blockade of maturity which causes the differentiation process of myeloid series cells to stop in young blast cells, this results in the accumulation of these blast cells in the bone marrow. This accumulation will cause disruption of normal hematopoiesis and ultimately result in bone marrow failure syndrome characterized by cytopenia (anemia, leukopenia and thrombocytopenia). This causes the main signs and symptoms of AML in the form of fatigue, bleeding and easy infection. In addition, there can also be infiltration of blast cells into organs which will cause signs and symptoms that vary depending on the organ infiltrated. Therefore, physical examination, complete blood count and bone marrow are important initial steps in the diagnosis of AML patients.

The success of AML treatment in Indonesia is still very low when compared to research reports from other countries. The most contributing factor to this is the high mortality due to severe infection or sepsis[8]. This is also closely related to the quality of supporting services and other infrastructure which is still limited in developing countries[9].

2. Case Report

A 61-year-old man complains of feeling weak all over his body since 2 days, the weakness has been felt since a month, sometimes he feels breathless and often feels like he's passed out. He also often complains of cold sweats and chills, nausea (+) vomiting (-), he complains of swollen gums, bleeding gums (-), nosebleeds (-) sometimes red urine, the patient also feels significant weight loss. not so drastic, sore throat (-), cough (-).

He has diabetes and was treated 6 months ago with insulin noporapid 3x6 IU, Lantus 0-0-19 IU. In January 2022 he was hospitalized with anemia and received a transfusion for 7 days. There is no history of cancer in family and his mother also has a history of diabetes. He does not smoke and drink alcohol. He has also received the COVID-19 vaccine twice.

The vital signs showed blood pressure 110/70 mmHg, heart rate 112/minute, RR 20/minute, temperature 37.5^{o}C, body weight 65 kg, oxigen saturation 99%. On physical examination within normal limits and found no abnormalities. The results of laboratory tests showed Hemoglobin 6.5 g/dL, Hematocrit 18.1%, Platelets 22x10^{3}/uL, MCV 82.4 fL, MCH 29.4 pg, GDS 363 mg/dL, ESR 1h 95 mm, ESR 2hrs 158 mm, LDH 540 U /L.

Then a peripheral blood smear was performed with the results of normochromic normocytic severe anemia with leukocytosis and thrombocytopenia ec suspected acute leukemia dd/Acute myeloid leukemia (AML) Acute lymphoblastic leukemia (ALL). Next, a BMP examination

was performed which showed Acute myeloid leukemia (AML)M2. The patient was diagnosed with Pancytopenia ec AML M2 with Type II Diabetes Mellitus (DM).

The patient was given DM diet therapy, IVFD Nacl 0.9% 20 tpm, Inj. Omeprazole 2X40 mg, Inj. Novarapid 3X6 IU, Inj. Lantus 0-0-19 IU, Transfusion of PRC 4 Kolf (2 Kolf/Day), and Folic Acid 2x1 mg.

3. Discussion

Complaints such as weakness throughout the body have been felt since 2 days, the weakness has been felt since a month, sometimes feels breathless and often feels like fainting, cold sweats and chills, nausea (+), sometimes red urine, and weight loss. On physical examination found gum atrophy and anemia. Symptoms and signs arising from the history and physical examination can support the diagnosis of AML[10,11].

AML patients can also be accompanied by the occurrence of pancytopenia, which is a decrease in hemoglobin levels (6.5 g/dL), hematocrit (18.1%), platelets ($22x10^3$/uL). Anemia in this patient was normochromic normoster as evidenced by the MCV value of 82.4 fL and MCH 29.4 pg[12].

In this case, the ESR 1h 95 mm and ESR 2hrs 158 mm were found, which means an increase. ESR reflects acute and chronic inflammation, cell death processes, degenerative processes, and lymphoproliferative diseases that can cause changes in plasma proteins found in the blood that result in clumping of red blood cells. Elevated ESR is a non-specific response to tissue damage and is an indication of disease. Elevated ESR indicates an active infection or previous unsuccessful treatment of the disease[11,12].

LDH is an enzyme that resides in cells and helps the process of converting sugar into energy. So in good health, the levels must also be normal. However, when cells are damaged which can be caused by various things, such as cancer or tissue injury due to infection, LDH will be released into the blood vessels. This then makes high LDH in the blood. In this patient showed LDH 540 U/L, elevated LDH levels are usually associated with acute or chronic tissue damage[12].

To confirm the diagnosis of AML, a peripheral blood smear can be performed showing severe normochromic normocytic anemia with leukocytosis and thrombocytopenia ec suspected acute myeloid leukemia (AML) Acute lymphoblastic leukemia (ALL). This was further strengthened by the results of the BMP, namely Acute myeloid leukemia (AML) M2, where the patient was diagnosed as having AML[11,12].

Cancer and diabetes occur together. In fact, about 8-18% of individuals with cancer also have diabetes. Most had diabetes before cancer. Others only found out they had diabetes after cancer was diagnosed or during cancer treatment.The results of this study indicate an increased risk of diabetes which is highest within 2 years after cancer is diagnosed. One reason is the effect of cancer treatment which is usually a combination of chemotherapy and corticosteroids. Corticosteroids are often given forreduces

the nauseating effect of chemotherapy, but has the side effect of increasing blood sugar levels.Cancer itself also has a direct impact on increasing the risk of diabetes, because cancer causes changes in the body's metabolism. One of them triggers insulin resistance so that blood sugar levels increase[11].

Another study published in JAMA Oncology 2018 involved 524,089 men and women aged 20-70 years. All had no history of diabetes or cancer at the start of the study. During the 10 year study period, 15,130 subjects developed cancer and 26,610 subjects developed diabetes.From these results, it was found that in general cancer increases the risk of diabetes by 35%. Based on the type of cancer, the risk of diabetes was found to be highest in patients with pancreatic cancer, where the number reached five times. In theory, decreased pancreatic function due to cancer will reduce the production and effectiveness of the hormone insulin so that blood sugar control is disrupted.

Regardless of which comes first, diabetes and cancer must be managed together. Cancer and its treatment can make diabetes worse. On the other hand, high blood sugar levels in diabetes can weaken the immune system, which is needed to fight cancer. Similarly, uncontrolled diabetes can delay or increase the risk of infection during cancer treatment.

The results of this study actually indicate the importance of early detection of diabetes as soon as cancer is diagnosed. By knowing it early, both cancer and diabetes can be managed optimally.

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