

# Acute myeloid leukemia presenting as pancytopenia— a rare case

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## Abstract

Pancytopenia is a diagnostic dilemma that can be caused in several conditions. Patients with pancytopenia should be evaluated thoroughly to find the causative factors using detailed clinical history and investigations. While megaloblastic anemia, aplastic anemia, and infections are common causes of pancytopenia, marrow space occupying lesions are rare causes of it. We present a case of an elderly patient with pancytopenia and no immature cells on peripheral smear. His bone marrow aspiration and biopsy studies along with immunophenotyping suggested a diagnosis of acute myeloid leukemia.

**KEY WORDS:** pancytopenia, leukemia, AML

## Introduction

Pancytopenia is a condition where there is a decrease in all the three formed elements of the blood: red blood cells (RBCs), white blood cells (WBCs), and platelets.<sup>[1]</sup> Criteria for diagnosis of pancytopenia being hemoglobin less than 10 g/dL, total leukocyte count less than 3,500/ $\mu$ L, and platelet count less than 100,000/ $\mu$ L.<sup>[2]</sup> Pancytopenia can be caused in a number of conditions leading to diagnostic dilemma.<sup>[3]</sup> The causative factors of pancytopenia vary in various populations based on the variations in age patterns, nutritional status, climate, and the prevalence of infections.<sup>[1]</sup> Patients with pancytopenia should be evaluated thoroughly to find the causative factors using detailed clinical history and investigations. We report a case of an elderly patient who presented with pancytopenia on peripheral smear. Further bone marrow aspiration and biopsy studies with immunophenotyping suggested

the final diagnosis of acute myeloid leukemia (AML), which is a rare cause of pancytopenia.

## Case Report

An 81-year-old man presented to the OPD with fever, dry cough, dryness of mouth, and mild breathlessness since 10 days. He was advised a routine hemogram. The sample was run on a fully automated Ac.T5 diff Beckman Coulter, which showed a very low total leukocyte count of 700/ $\text{mm}^3$ , with 78% lymphocytes of which 9% were atypical lymphocytes, 11% neutrophils, and 11% monocytes. The hemoglobin was 6.2 g%, hematocrit 19%, and RBC count  $2.37 \times 10^6/\mu\text{L}$  [Figure 1]. The mean corpuscular volume was 80 fL; mean corpuscular hemoglobin, 26.1 pg; and mean corpuscular hemoglobin concentration, 32.6 g/dL, and RBC distribution width (coefficient of variation) was high being 17.8%. The peripheral smear examination showed anisopoikilocytosis with macrocytes, microcytes, schistocytes, target cells, basophilic stippling, and hypochromia of RBCs. The platelet count was also reduced to 39,000/ $\mu\text{L}$  [Figure 2]. The mean platelet volume was 7.7 fL and reticulocyte count 0.6%. The patient was advised bone marrow examination. The smears prepared from bone marrow aspiration showed a high myeloid/erythroid ratio of 25:1. The myeloid series of cells showed 52% blasts, only 5% mature lymphocytes, and 1% plasma cells [Figure 3]. On immunophenotyping, 55% of the blasts were CD45 positive.

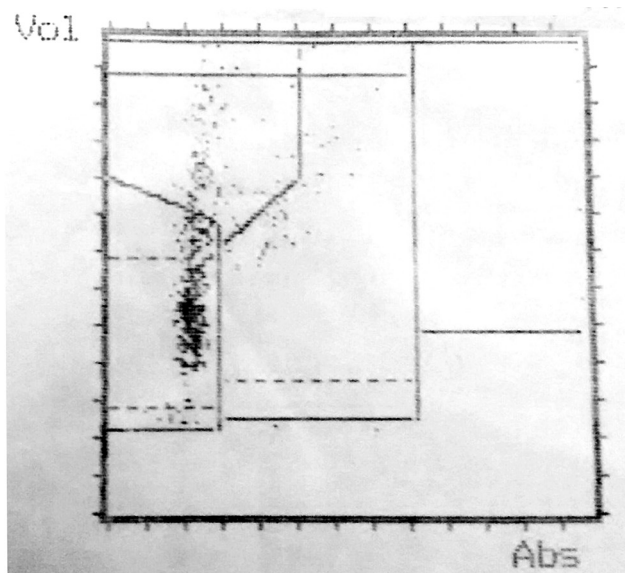
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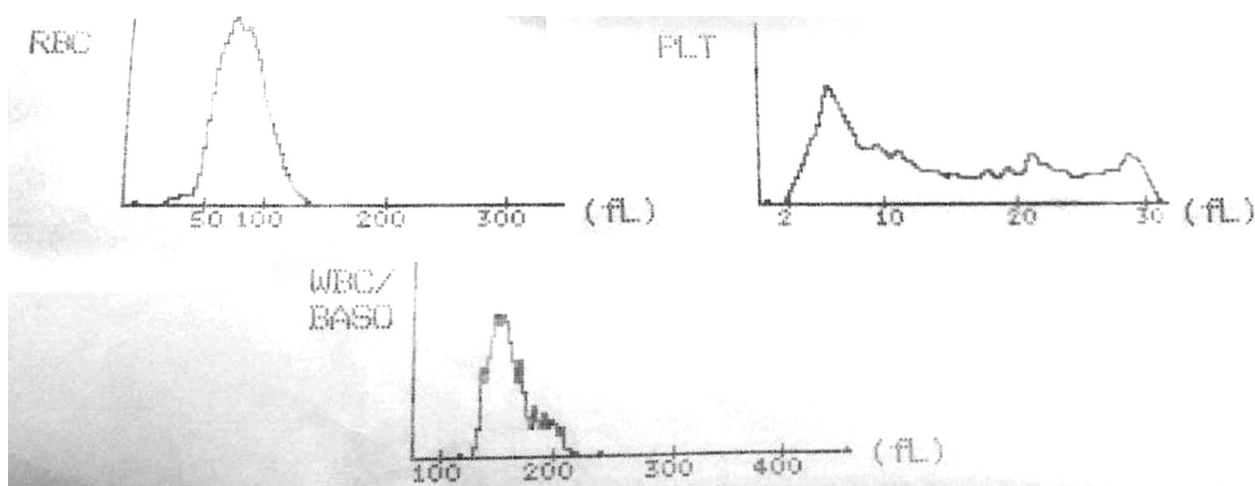
**Figure 1:** Scatterplot showing leukopenia.

The myeloid series showed 94% CD13, 82% CD33, 88% CD117, 73% CD34, and 41% HLA-DR positive. The bone marrow biopsy was hypercellular for age with an increase in reticulins. The erythropoiesis was macronormoblastic. There was a shift to left in granulopoiesis. The megakaryoblasts were markedly reduced with reactive plasmacytosis. CD117 and CD34 each marked approximately 50% of the myeloid progenitor cells. The final diagnosis of AML was offered.

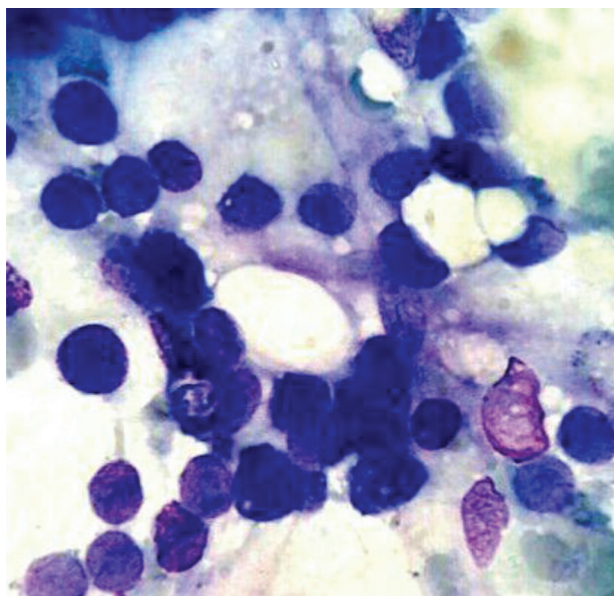
## Discussion

Very few studies regarding the etiological spectrum of pancytopenia have been reported from India.<sup>[1]</sup> Patients generally reveal complaints attributed to anemia, thrombocytopenia,

and, rarely, leukopenia, which, in advanced stages, is accountable for the effortless course.<sup>[2]</sup> Jha *et al.* found 21.62% cases of pancytopenia with hematological malignancies. The different malignancies that caused pancytopenia in their study were AML (62.5%), acute lymphocytic leukemia (28.12%), plasma cell myeloma (3.12%), non-Hodgkin's lymphoma (3.12%), and myelodysplastic syndrome (i.e., refractory anemia with excess of blasts, 2 (3.12%)).<sup>[4]</sup> They, however, found that patients of AML with pancytopenia in the age group of 2–75 years with hemoglobin in the range of 1.2–9.6 g%, total leukocyte count in the range of 800–3,600/mm<sup>3</sup>, and platelets in the range of 6,000–125,000/mm<sup>3</sup>.<sup>[4]</sup> Our patient was much older but the other findings were in the same range.<sup>[4]</sup> Appelbaum *et al.*<sup>[5]</sup> found the maximum incidence of AML in patients younger than 56 years of age and the incidence decreased to 8.2% of all AML cases in patients older than 75 years of age. The common causes of pancytopenia vary in different studies and include megaloblastic anemia, aplastic anemia, hepatitis-associated aplasia, drugs, infections, and autoimmune disorders.<sup>[1]</sup> Khodke *et al.*<sup>[2]</sup> found maximum number of cases of pancytopenia in the age group of 12–30 years and 10% of the cases in the age group of more than 60 years. The commonest presentation was fever in 40% followed by weakness in 30% and bleeding manifestation in 20% of cases.<sup>[2]</sup> Hypersegmented neutrophils were seen in 40% cases and peripheral blood smear showed dimorphic anaemia in 20% cases.<sup>[2]</sup> Our patient had normal segmented neutrophils but red blood cells showed anisopoikilocytosis with both macrocytes and microcytes. Reticulocytosis was seen in 6% cases in his study.<sup>[2]</sup> Our patient had normal reticulocyte count. Patients with pancytopenia have either cellular or hypocellular bone marrow morphology. There are very few studies in the literature that explore the various aetiological factors of pancytopenia with hypocellular and cellular marrows.<sup>[1]</sup> Santra and Das<sup>[1]</sup> also found that severe anaemia was more common in patients with hypocellular marrow than in those with cellular marrow. Santra and Das<sup>[1]</sup> found that



**Figure 2:** RBC, platelets, and WBC histograms showing pancytopenia.



**Figure 3:** Bone marrow aspirate smear demonstrating myeloblasts.

only 1.8% cases of AML or sub leukemic leukemia as a cause of pancytopenia with cellular marrow and that too in the age group of 13-30 years. He reports no case in the age group to which our patient belongs. Kumar *et al.*<sup>[6]</sup> have reported a leukemic leukemia as a common cause of pancytopenia and Khunger *et al.*<sup>[7]</sup> have reported sub leukemic leukemia as a rare cause of pancytopenia.

Khodke *et al.* reported that one case of leukemia as a result of pancytopenia of the 50 cases they studied. The pathway of the development of pancytopenia seems to be related to reduction in hematopoietic cell production owing to destruction of the marrow tissue by toxins, substitution by abnormal or malignant tissue, or perhaps destruction of regular growth and differentiation.<sup>[2]</sup> Few patients reveal normally cellular marrow or even hypercellular marrow and absence of abnormal cell.<sup>[2]</sup> Markovic *et al.* demonstrated the unusual presentation of AML-M2 as a bone marrow necrosis leading to pancytopenia. They found that, chiefly, CD8<sup>+</sup> T-cell infiltrate swamping the AML blasts in near vicinity to the surroundings of extensive marrow necrosis suggesting the probability that the T cells themselves may be the causative factor for the necrosis of

the marrow.<sup>[8]</sup> However, in our case, we did not find areas of necrosis in the marrow, and the cause of pancytopenia was rather replacement of normal marrow by malignant cells.

## Conclusion

All the patients of pancytopenia should be evaluated thoroughly to identify the cause of it. Bone marrow studies form an important investigation, which can be hypocellular or cellular. Hematological malignancies and, as we report, AML could be a cause of pancytopenia even in patients older than 80 years of age.

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