

Bone Marrow Examination in Cases of Pancytopenia

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Abstract: Background: Pancytopenia is a relatively common hematological entity. This study was undertaken to find out the various causes of pancytopenia by bone marrow examination

Methods: This was a retrospective study carried out to identify the causes of pancytopenia based on bone marrow examination. Bone marrow examinations were performed in 98 cases for indications over a period of one year, fulfilled the criteria of pancytopenia.

Results: Total 98 cases of pancytopenia were examined during period of one year. The commonest cause of pancytopenia was megaloblastic anemia (33%) followed by aplastic/hypoplastic anemia (31%). other cause includes acute leukemia, myelodysplastic syndrome (MDS) and myelofibrosis. **Conclusions:** Bone marrow aspiration coupled with trephine biopsy can diagnosed majority cases of pancytopenia. Megaloblastic anemia and aplastic anemia are the commonest causes of pancytopenia. A comprehensive clinical and hematological study of patients with pancytopenia will help in the identification of Underlying cause.

Keywords: Bone marrow, Pancytopenia

Date of Submission: 22-04-2018

Date of acceptance: 08-05-2018

I Introduction

Pancytopenia is a relatively common hematological entity which is encountered routinely. Pancytopenia is a disorder in which all three formed elements of blood; red blood cells, white blood cells and platelets decreased than normal. Pancytopenia is not a disease entity but a triad of finding that may results from number of disease processes. Pancytopenia develops from variety of mechanism. It could be associated with decrease in hematopoietic cell production either due to destruction of marrow tissue by toxins or replacement by malignant or abnormal cells or suppression of normal growth and differentiation. Other mechanism including ineffective haematopoiesis with cell death in the marrow, formation of defective cells which are rapidly removed from circulation, sequestration and/or destruction of cells by

the action of antibodies or, trapping of normal cells in a hypertrophied and over-reactive reticuloendothelial system¹. Bone marrow cellularity varies depending upon the cause. Marrow is hypocellular in primary production defect while in case of ineffective erythropoiesis, increased peripheral utilization or destruction of cell and bone marrow with malignant infiltration are associated with hypercellular and normocellular marrow². The presenting symptoms are usually attributable to the anemia or the thrombocytopenia. Leucopenia is an uncommon cause of initial presentation of the patient, but can become the most serious threat to life during the subsequent course of the disorder². The frequency of underlying pathology causing pancytopenia varies considerably depending upon various factors including geographic distribution³. Marrow aspiration is assessed for cytology and trephine biopsy provides overall cellularity, detection of focal lesion and infiltration. The severity of pancytopenia and underlying pathology determine the management and prognosis of patients. The aim of present study was to identify diagnostic reliability of bone marrow aspiration and biopsy in various cause of pancytopenia.

II Methods

This was a retrospective study conducted over a period of one year (December 2016 to November 2017) in the department of Pathology, Madras medical college, Chennai. All the cases of pancytopenia with hemoglobin less than 10 gm/dl, total leucocyte count of less than

4000/mm³ and platelet count less than 150,000/mm³ were included in the study. Cases of chemotherapy induced pancytopenia were excluded. Relevant clinical findings of the patients were obtained. The bone marrow aspirate, blocks and slides of all the patients over a period of one year, were retrieved and

reviewed. All biopsy slides were stained with hematoxylin and Eosin stains and aspirate slides are stained with leishmann stain Special stains and immunohistochemistry were used where required.

III Results

During the study period of one year, 98 cases of pancytopenia fulfilling the inclusion criteria were included in the study. Age ranged from 2 years to 86 years. Maximum number of cases were seen in age group of 15-35 years (42.8%). 55 cases were male and 43 cases were female, male to female ratio is 1.2:1 .The commonest presenting complaint was fever in 40%. Pallor was present in all the patients,

Table 1: Bone marrow aspiration and biopsy diagnosis

DIAGNOSIS	NUMBER OF CASES	PERCENTAGE(%)
Megaloblastic Anaemia	32	33
Hypoplastic anaemia	30	31
Normal	13	13
Myelofibrosis	5	5
Myeloproliferative disorder	4	4
Acute leukemia	4	4
Erythroid hyperplasia	3	3
Chronic myeloid leukemia	2	2
Acute lymphoblastic leukemia	2	2
Myelodysplastic syndrome	1	1
Haemolytic anaemia	1	1
Granulomatous	1	1
Total	98	100

The commonest cause of pancytopenia (TABLE:1)was megaloblastic anemia and was seen in 32/98 (33%), and followed by hypoplastic anemia (31%). The other causes of pancytopenia were acute leukemia ,myelofibrosis, myeloproliferative disorder, myelodysplastic syndrome erythroid hyperplasia,haemolytic anaemia, chronic myeloid leukemia and granulomatous lesion(fig:1).

IV Discussion

Pancytopenia is a common hematological finding with variable clinical presentations. It often creates diagnostic challenge to physician and the knowledge of accurate etiologies of this condition is crucial in the management of the patient². In this study, most cases were seen in adults (15-35 years) and only 10 cases were seen in children. Male patients slightly outnumbered the female with male to female ratio 1.2:1 and this was similar to study of Makaju et al 1.5:1, Jha et al (1.3:1) However Aziz et al found more in females^{2,4,5}. The incidence of megaloblastic anemia varies from 0.8% to 32.26% of all pancytopenic patients.^{3,6-8} In present study megaloblastic anemia(fig:2 & 3) is still the commonest cause of pancytopenia. This constituted 33% of total cases of pancytopenia. Findings are similar to other studies tilak and khodke et al in which megaloblastic anemia is a common cause of pancytopenia.^{3,9} While this findings are sharp contrast with various studies from the world in which aplastic anemia is commonest cause this may be due to high prevalence of nutritional anemia in Indian subjects leads the increased frequency of megaloblastic anemia³. The cause of megaloblastic anemia was not studied in this study and evaluation of serum folate or vitamin B12 was not available in this study. The second major cause of pancytopenia was aplastic/ hypoplastic anemia in present study (31%)which was correlated with Tilak et al and khodke et al^{3,9}. Jha et al and Pathak et al have aplastic anemia as common cause of pancytopenia^{2,4}. In a study by Keisu et al neoplastic disease was the commonest cause of pancytopenia⁷.

Aplastic/hypoplastic anemia may be due to environmental factors or exposure to pesticides/ drugs/ toxic chemicals. Although the incidence of aplastic anemia is higher our study than

west which is reported to be between 10-25%⁵. Acute leukemia was found to be third most common in our study constituted 6.1% of total cases of pancytopenia in present study findings are similar to the study of Aziz et al acute leukemia constituted almost 10% of cases of pancytopenia and was third most common cause of pancytopenia⁵. However percentage very low as compared to study of Jha et al in which it constituted 19.59% of total cases of pancytopenia⁴. However, in study of Tilak et al only 1 case of acute leukemia was detected as a cause pancytopenia³. Immature cells can be seen in peripheral smears or in smears made from buffy coat. Bone marrow aspiration establishes the diagnosis; however, if the tap is dry then bone biopsy becomes mandatory for diagnosis. Only one case of myelodysplastic syndrome was diagnosed in our study. It was the second most common cause of pancytopenia in studies by International agranulocytosis and aplastic anemia group⁶. three case of erythroid hyperplasia was noted. Erythroid hyperplasia by itself is not the cause of pancytopenia. Relationship of erythroid hyperplasia to pancytopenia is uncertain. A possible hypersplenism needs to be ruled out in addition to different hemolytic anemias in cases of marrow showing erythroid hyperplasia. No splenomegaly was seen in case of erythroid hyperplasia in present study. In cases of erythroid hyperplasia, correlation with clinical parameters and other laboratory parameters are required². Incidence of Kala azar was high as cause of pancytopenia in various studies however we did not get kala azar as cause of pancytopenia. This is due to different geographic distribution. Kala azar is most common in residence of Bihar¹⁰. Difference in the frequency of disorders causing pancytopenia has been due to variation in study design, diagnostic criteria, geographic area, duration of observation, genetic differences and varying exposure to cytotoxic/chemical agents.

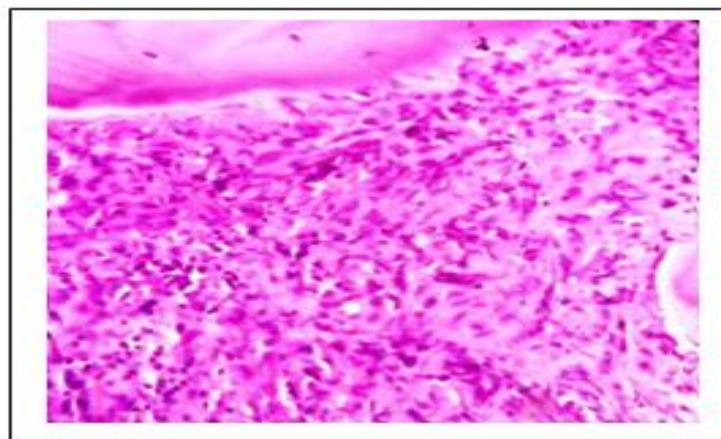
V Conclusion

The present study concludes that physical examination, primary hematological investigations along with bone marrow aspiration coupled with biopsy in pancytopenic patients are helpful for understanding disease process and to diagnose or to rule out the causes of pancytopenia. These are also helpful in planning further investigation and management.

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FIG:1:BMBX:40X:GRANULOMATOUS LESION



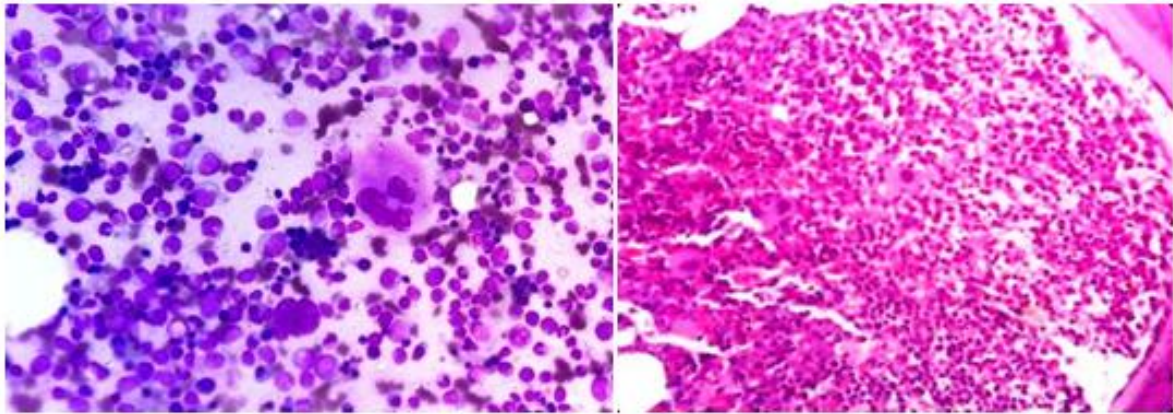


FIG:2&3:BMA(10X)&BMBX(40X)-MEGALOBLASTIC ANAEMIA

Dr.Sakunthala." Bone Marrow Examination in Cases of Pancytopenia."IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 5, 2018, pp 75-78.