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Study of bone marrow examination findings in pancytopenia

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ABSTRACT-
Background- Pancytopenia is a reduction in hemoglobin concentration (anemia), total leucocyte count (leucopenia) and platelet count (thrombocytopenia). It could be a manifestation of a variety of etiologic factors. It is pertinent to consider clinical details, peripheral blood smear findings and bone marrow aspiration report in conjunction, to pinpoint the cause which is often challenging. There are varied causes of pancytopenia which will be highlighted in this study.
Objectives-The objectives of this study were to find out the etiology of pancytopenia in this region.
Materials and methods-This is a retrospective medical records based study of patients diagnosed to have pancytopenia from PBS. Bone marrow aspiration was done and studied after appropriate staining from 2019 to 2020.
Results-Out of 62 bone marrow aspirations of pancytopenicpatients, 46.8% (29) cases were due to megaloblastic anemia, followed by Aplastic anemia 24.2%(15) cases. The third most common etiology was Acute leukemia 19.4% (12 cases), which was mostly subleukemic or aleukemic leukemia on PBS.
Conclusion- Megaloblastic Anemia is the most common cause of Pancytopenia in this region closely followed by Aplastic anemia (secondary).
keywords- Pancytopenia, Bone Marrow Aspiration, Megaloblastic Anemia, Aplastic anemia.

I. INTRODUCTION:

Pancytopenia is commonly encountered in clinical practice.it is characterized by hemoglobin value <12g/dl, total leukocyte count <4000/cumm, platelet count <1.4 lacs in adults[1]. It has varied etiologies, which require peripheral blood smear evaluation in conjunction with bone marrow studies. The underlying mechanisms are decrease in hematopoietic cell production, marrow replacement by abnormal cells, suppression of marrow growth and differentiation, ineffective hematopoiesis, antibody mediated destruction and trapping of red cells in hypertrophied reticuloendothelial system[2]. Usual clinical presentations of pancytopenia include pallor, dyspnea, bleeding, bruising, recurrent infections[3]. Bone marrow aspiration is the most useful diagnostic process that may give valuable information in >50% cases[4]. Pancytopenia could present as normocellular, hypocellular or hypercellular marrow[5].

Peripheral blood smear review is of value in establishing a definitive diagnosis, suggesting differential diagnoses and recommendation for further evaluation[6]. This study is aimed at correctly identifying the etiology of pancytopenia using marrow aspiration.

II. MATERIALS AND METHODS:

A retrospective study of 62 cases of pancytopenia in the year 2020-2022 was done. All patients of both sexes and age group 1 year onwards were included in the study. Patients having pancytopenia on peripheral blood film who consented for bone marrow aspiration were other inclusion criteria. Patients on chemotherapy, uncooperative, who did not give consent or patients having coagulation abnormalities were excluded from the study. Detailed clinical history was obtained and physical examination done. Bone marrow aspiration was performed using 16G salah's needle, stained with May Grunwald Giemsa stain after fixation in methylene. Perl's stain, Periodic acid Schiff, and Myeloperoxidase stains were performed wherever necessary. The smears were studied and the following parameters noted- 1.Cellularity, 2.Myeloid to erythroid ratio, 3.Erythropoiesis, 4.Myelopoiesis, 5.Megakaryopoiesis, 6.Lymphocytes, 7.Plasma cells, 8.Hemoparasites, 9.Abnormal cells 10.Marrow iron stores, 11.Cytochemistry (wherever needed).

Data was entered and analyzed in statistical software (SPSS-16). Frequency and percentage were calculated for different individual age, sex, clinical features and bone marrow findings.

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III. RESULTS:

There were 62 patients with pancytopenia included under the study. There were 40 males and 22 females. Male female ratio was 1.8:1. The mean patient age was 34.5 years.

Table1 shows common etiological factors of pancytopenia. The single most common cause was found to be megaloblastic anemia in 46.8% (29) cases followed by Aplastic anemia 24.2%(15), Acute leukemia and Hypersplenism. We also diagnosed 2 cases of gelatinoustransformation of bone marrow.

Table 1: Etiologic spectrum of Pancytopenia n=62

Serial no.	Disease	No of cases	% of cases
1.	Megaloblastic Anemia	29	46.8%
2.	Aplastic Anemia	15	24.2%
3.	Acute Leukemia	12	19.4%
4.	HLH	2	3.2%
5.	Hypersplenism	2	3.2%
6.	Leishmaniasis	1	1.6%
7.	Gelatinous Transformation	1	1.6%

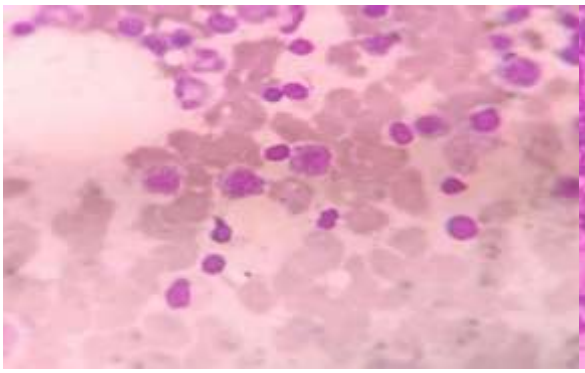

Figure1: Megaloblast in Megaloblastic anemia (BMA, Leishman Stain, 400x).

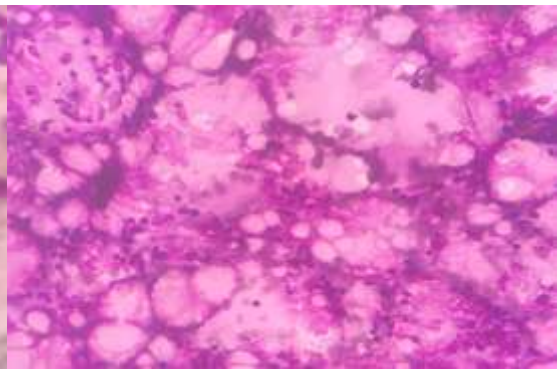

Figure2: Aplastic anemia showing decrease cellulatity (BMA, Leishman Stain, 400x)

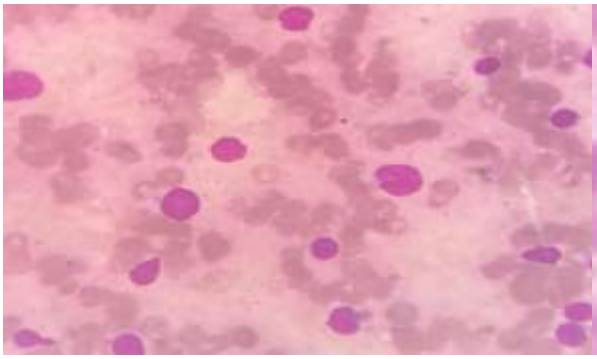

Figure3: Lymphoblast in ALL (BMA, Leishman Stain, 400x)

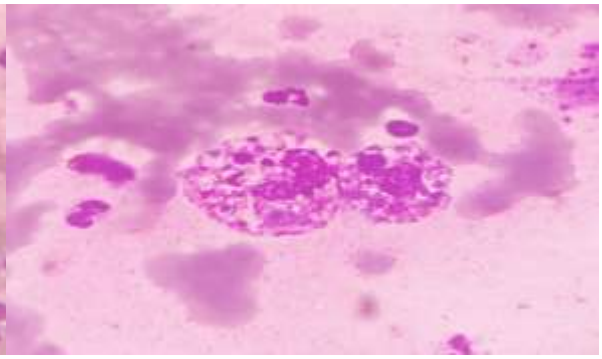

Figure4: HLH Sydrome showing hemophagocytic cells (BMA, Leishman stain, 1000x)

IV. DISCUSSION:

In our study mean patient age was 34.5 years and M:F ratio was 1.8:1. According to a study by Dasgupta S et al [7], mean patient age was 33 years with M:F ratio 1.7:1.

We observed that pancytopenic patients were younger, which is consistent with Farooque R et al[8] and Hayat et al[9].

The most common etiology of pancytopenia(46.8%) was Megaloblastic anemia according to our study (42%). According to a study by Jain A et al[10], hypersplenism was the leading

cause of pancytopenia. In a study by Carretero C et al[4], the most common cause of pancytopenia was Myelodysplastic Syndrome (20.2%), followed by megaloblastic anaemia (18.3%). A study by Dhooriaet al[11] Megaloblastic anemia was the commonest etiology of pancytopenia.

In our study, the second commonest cause (24.2%) was found to be Aplastic Anemia, comprising 18.9% cases. According to BasakTB et al[12] the leading cause of Pancytopenia was found to be Aplastic Anemia (36%) cases.

The third common cause of pancytopenia was Acute Leukemia(19.4%) especially in pediatric age group. According to a study by Khan AAetal[13], (11.25%) cases of pancytopenia are due to Acute Leukemia.

V. CONCLUSION:

Pancytopenia presents with varied clinical manifestations and differing etiologies. Bone marrow aspiration plays an important role in evaluation of pancytopenic patients especially in aleukemic leukemia. Understanding the etiology of pancytopenia aids in proper patient management.

Acnowledgement: Nil
Conflict of interest: Nil

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