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A Study on Evaluation of Pancytopenia on Bone Marrow Aspiration

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ABSTRACT

BACKGROUND: *Pancytopenia is a hematological condition presenting with symptoms of Anemia, Leucopenia and Thrombocytopenia. It is caused by multitude of different etiologies like Megaloblastic anaemia, Aplastic anaemia, Infections, Leukemias and secondary malignancies. Bone marrow aspiration helps in identifying the cause of Pancytopenia.*

AIMS AND OBJECTIVES:

1. *To evaluate and identify the different causes of pancytopenia.*

2. *To determine the frequency of different causes of Pancytopenia in different age groups.*

MATERIALS AND METHODS: *The present study is carried out for the period of 5 years duration as cross sectional analysis conducted on 90 cases of Pancytopenia from July 2017 to June 2022 in the Department of Pathology, Sri Venkateswara Medical College, Tirupati. Bone marrow aspiration (BMA) was performed from posterior superior iliac spine under asceptic conditions with Salah needle.*

RESULTS:

A total of 90 cases were studied during a period of 5 years. Age of patients ranged from 2 years to 75 years with mean of 39.6 years. 55 cases were male, and 35 cases were female with male:female ratio of 1.5 :1. The commonest cause of pancytopenia was megaloblastic anaemia seen in 36 cases (40%) followed by erythroid hyperplasia seen in 22 cases (24.5%). 10 cases (11.1%) were of acute leukaemia. Other causes of pancytopenia were myelodysplastic syndrome, plasma cell dyscrasias, iron deficiency anaemia and hemophagocytic lymphohistiocytosis

CONCLUSION:

Bone marrow aspiration in patients of pancytopenia helps in the identification of the underlying cause in most of the cases. BMA is helpful for understanding the disease process; and in planning further investigations and management of cytopenia patients.

KEYWORDS: *Pancytopenia, Bone marrow aspiration, Megaloblastic anaemia.*

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I. Introduction:

Pancytopenia refers to combination of anaemia, leucopenia and thrombocytopenia[1] associated with decrease in the production of hematopoietic cells due to destruction of marrow tissue by toxins or replacement by malignant or abnormal cells or suppression of normal growth and differentiation.

Pancytopenia is a manifestation of a wide variety of disorders, which primarily or secondarily affect the bone marrow like Megaloblastic anaemia, Aplastic anaemia, Infections, Leukemias and secondary malignancies[2]. Determining the cause of pancytopenia is a challenge and is the key in determining the proper treatment regimen and estimating prognosis. Early diagnosis with the help of bone marrow examination and timely initiation of specific and supportive treatment reduce the morbidity and mortality thereby improving the quality of life.

II. Materials And Methods

INCLUSION CRITERIA:

Cases with Hemoglobin < 10gm/dl, Total leucocyte count < 4000/mm^3 and platelet count < 100,000/mm^3

EXCLUSION CRITERIA:

- Known pancytopenia patients receiving chemotherapy /radiotherapy.

➢ With prior consent BMA was performed under strict aseptic conditions with Salah needle from posterior superior iliac sine and aspirated 0.5 to 1.5 ml of aspirate. Smears are stained with Leishman stain for microscopy and correlated with Bone marrow biopsy and special stains (PAS, Perls stain) wherever required.

III. Results:

A total of 90 cases were studied during a period of 5 years. Age of the patients ranged from 2 years to 75 years with a mean age of 39.6 years. 55 cases were male and 35 cases were female with male to female ratio of 1.5:1. About 18.8% cases were between age group of 20 – 30 years (Table 1). Most common clinical presentation was easy fatigability.

Table 1: Age wise distribution of cases of Pancytopenia.

Age in years	Male	Female	Total	Percentage
<10	6	5	11	12.2%
11-20	3	4	7	7.8%
21-30	12	5	17	18.8%
31-40	3	7	10	11.2%
41-50	9	6	15	66.6%
51-60	11	3	14	15.5%
61-70	5	5	10	11.2%
71-80	6	0	6	6.7%
	55 (61%)	35 (39%)	90	100%

In the present study most common cause of Pancytopenia was Megaloblastic anaemia seen in 36 cases (40%) followed by Erythroid hyperplasia in 22 cases (24.5%). 10 (11.1%) cases were of acute leukemia. Dual deficiency anaemia was seen in 9 cases (10%). Other causes of pancytopenia were Iron deficiency anaemia, Myelodysplastic syndrome, Plasma cell dyscrasias, Hemophagocytic lymphohistiocytosis. 6 cases were inconclusive. Bone marrow aspiration findings are shown in Table 2.

Table 2: Bone Marrow Aspiration findings.

Diagnosis	No Of Cases	Percentage
Megaloblastic Anaemia	36	40
Iron Deficiency Anaemia	2	2.2
Dual Deficiency Anaemia	9	10
Erythroid Hyperplasia	22	24.5
Acute Leukemias	10	11.1
Plasma Cell Dyscrasias	2	2.2
Myelodysplastic Syndrome	1	1.1
Haemophagocytic Lymphohistiocytosis	1	1.1
Hypocellular	1	1.1
Inconclusive	6	6.7

IV. Discussion

In the present study 90 cases were included. Age of the cases ranged from 2 to 75 years with mean of 39.6 years. Male:female ratio was 1.5:1. Khunger et al carried a study on 200 cases in which the age ranged from 2-70 years with male:female ratio of 1.2:1.[3]

In a study by Khan SP et al range of age was 1 – 85 years with male female ratio of 1.2:1.[4] .Similar findings were seen in some other similar studies.

The incidence of megaloblastic anaemia varies from 0.8% to 32.26% of all panctytopenic patients.[5,6] commonest cause of Pancytopenia in the present study is megaloblastic anaemia accounting for 40%. (Figure1). In a similar study done by Shah P et al megaloblastic anaemia was the commonest cause of Pancytopenia constituting 35%.[7] Megaloblastic anaemia was commonest cause of pancytopenia in a study conducted by Tilak et al, Khodke et al accounting for 68% and 44%.respectively [8,9]. Similar results were seen by some other studies of Khunger et al, Manzoor et al, Dahake et al and Rangaswamy et al.[3, 10-12]

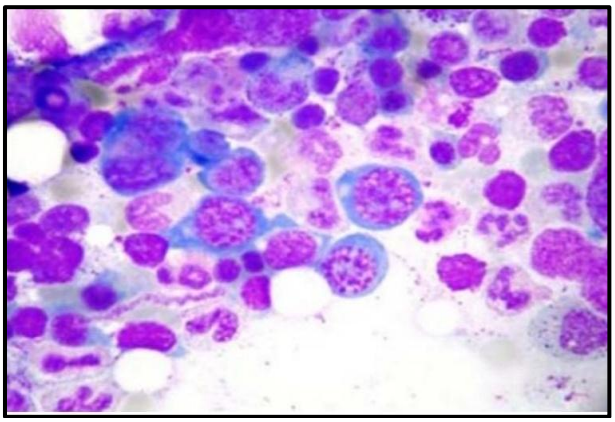

Fig 1: Photograph of BMA smear of Megaloblastic anaemia showing Megaloblasts with nuclear to cytoplasmic asynchrony and seive like chromatin. (Leishman stain 10x X 100x)

In present study 24.5% of cases showed normoblastic erythroid hyperplasia. In a similar study done by Pathak et al 20% of BMA showed erythroid hyperplasia.[13] Khodke et al found Normoblastic erythroid hyperplasia with peripheral pancytopenia in 14% of cases.[9]

The incidence of acute leukemia varies between 1.61% - 14.5 % in different Indian studies.[14, 15] In the present study, 11.1% of cases were of acute leukaemia (Figure 2).In the study conducted by Patel GR et al acute leukemia is the most common cause of Pancytopenia constituting 17.9% [16]. In a study conducted by Mir et al acute leukaemia was the second most common cause present in 6.78% of total patients.[17] Acute leukemia constituted 8.8% of total cases of pancytopenia in a study conducted by Pathak et al.[13]

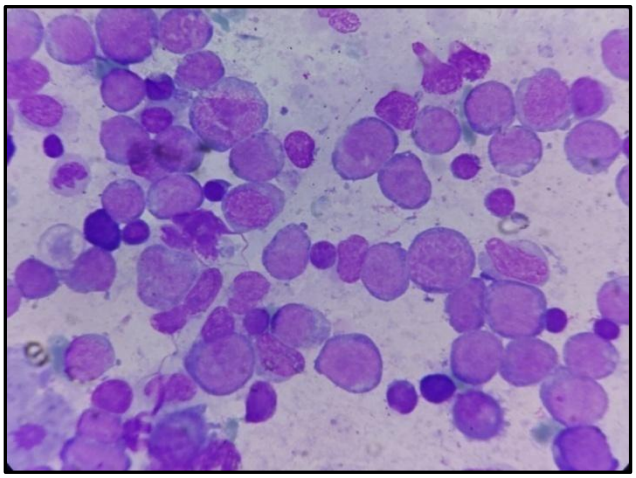

Fig 2: Photograph of BMA smear of AML M2 showing hypercellularity with >70% of atypical blast cells with high N/C ratio and 2- 3 prominent nucleoli and moderate amount of cytoplasm. (Leishman stain 10x X 100x)

In the present study, dual deficiency anemia was seen in 10%. In a study conducted by Kulkarni et al, dimorphic anaemia was the commonest cause of pancytopenia seen in 36.23% of cases.[18] In present study, Plasma cell dyscrasia was seen in 2 . 2 % cases. More than10% plasma cells were seen on BMA in these cases (Figure 3). This is comparable to studies by Mir et al and Khodke et al constituting 5.30% and 4% of cases respectively.[17, 9]

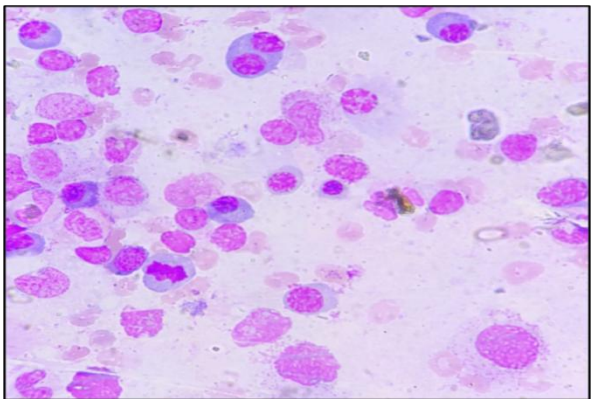

Fig 3: Photograph of BMA smear of Plasma cell dyscrasia showing Increase in mature plasma cells (>10%) with eccentric nucleus and peri nuclear hof. Also shows binucleate forms. (Leishman stain 10x X 100x)

Dasgupta et al, reported an incidence of 2.42% of myelodyspastic syndrome, while present study had 1.1% incidence of myelodysplatic syndrome.[14] Mir et al in theirstudy had MDS with an incidence of 3.03%.[17]

In the present study Iron deficiency anaemia was seen in 2.2% cases. In the study conducted by Khan S P et al Iron deficiency anemia was seen in 2% of cases.[4] In the present study Hemophagocytic lymphohistiocytosis was seen in 1.1 % cases. In the study conducted by Patel G R et al it was seen in 1.8% of cases[16]. In the present study 6 cases were inconclusive.

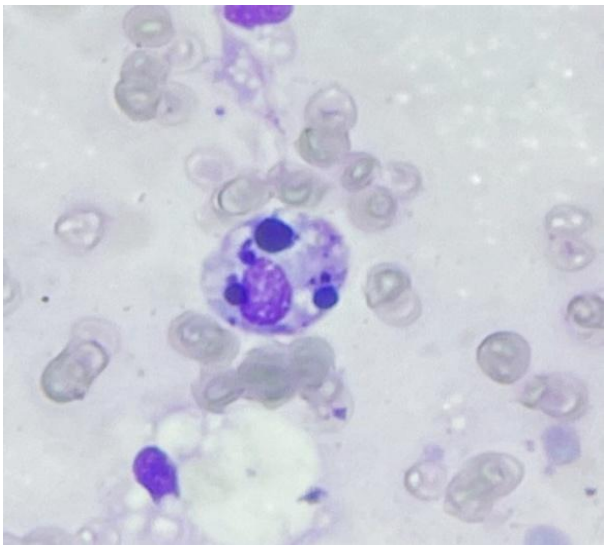

Fig 4: Photograph of BMA smear of Histiocyte showing haemophagocytosis predominantly of lymphocytes. (Leishman stain 10x X 100x)

V. Conclusion:

Most of the causes of pancytopenia are treatable and reversible.In the present study Megaloblastic anaemia is the most common cause. M/c age group is 21 to 30 years with male: female ratio of 1.5:1. Detailed clinical history, hematological investigations along with bone marrow examination helps in accurate diagnosis and evaluation of causes of Pancytopenia. Timely intervention reduces the morbidity and mortality**.**

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