International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Spectrum of Haematological Disorders on Bone Marrow Examination in a Tertiary Care Hospital

Dr. Samatha K K[1], Dr. Shakira Anjum[2], Dr. Swarajya Kumari K[3], Dr. Srivani N[4]

[s]Postgraduate, Osmania Medical College, Koti, Hyderabad.
[2]Associate Professor, Osmania Medical College, Koti, Hyderabad.
[3]Professor, Osmania Medical College, Koti, Hyderabad.
[4]Professor & Head of Department, Osmania Medical College, Koti, Hyderabad.

Abstract

Background: Hematological disorders are quite common in all age groups. The most common presentation is Anemia. Bone marrow examination is a necessary adjunct to the study of diseases of the blood and how a correct diagnosis can be made. The study aimed to analyze the various causes of haematological disorders.

Aim of the study: To study the spectrum of haematological disorders on bone marrow examination, to know the age and sex incidence and to determine the causes of pancytopenia.

Materials and Methods: This was a retrospective study carried out in the upgraded department of pathology, Osmania General Hospital, Hyderabad, Telangana from May 2022 to April 2023. Bone Marrow Aspiration of 100 cases of suspected haematological disorders was carried out complete detailed history, examination and complete blood counts were recorded.

Results: In this study, out of 100 cases, the age of patients ranged from 11 to 80 years with a mean age of 31.8 years with male preponderance (1.5: 1). Most of the patients clinically presented with fever, easy fatiguability and generalized weakness. The most common cause is Megaloblastic Anemia (45%), followed by normal bone marrow study (22%), hypocellular marrow (12%), acute leukaemia (10%), idiopathic thrombocytopenic purpura (6%), multiple myeloma (4%), granulomatous disease (1%).

Conclusion: The current study showed the usefulness of bone marrow aspiration in the evaluation of bone marrow in routine haematological disorders and for understanding disease progression.

Keywords: Bone Marrow Aspiration, Hematological disorders, Megaloblastic Anemia.

INTRODUCTION

Bone marrow aspiration is a common procedure done in hospitals. It is an invasive and safe procedure when performed with proper precautions. It is a routine procedure performed in medical institutions for the diagnosis and management of various haematological disorders.[(1,2)] Haematological disorders are common and have varying clinical presentation, usually presenting with anaemia in any age group. Anaemia is common worldwide, particularly in developing countries. The spectrum of haematological

disorders differs from one country to another. The diagnosis can be made by clinical examination, complete blood picture and confirmed only by bone marrow examination. These all procedures help in arriving at a conclusive diagnosis. Bone marrow aspiration plays an important role in explaining pancytopenia, and in diagnosing leukaemias and storage disorders.[3] Haematologists, defined pancytopenia as the simultaneous presence of anaemia, leucopenia and thrombocytopenia. This triad of findings may result from many disease processes. The
haematopoietic cell production in the bone marrow can be influenced by infections, toxins, and malignant cell infiltration leading to hypocellular marrow. Ineffective hematopoiesis, maturation arrest of all the cell lines, peripheral sequestration of blood cells
or peripheral destruction of all blood cell lineage can also be the cause of pancytopenia.[4-7]

- Bone marrow aspiration (BMA) is a common procedure, though invasive but safe when performed with proper precautions.
- Bone marrow aspirations should be carried out by trained individuals who are aware of the indications, contraindications, and hazards of the procedure.
- It is routinely done in medical institutions for the diagnosis and management of haematological disorders.
- This procedure is carried out for cytological assessment, immunophenotypic, cytogenetic, molecular genetics and other special investigations.
- This helps us to identify the causes and morphology of bone marrow in cases of pancytopenias**.**

AIM OF THE STUDY

To study the spectrum of haematological disorders on bone marrow, to know the age and sex incidence, and to determine the causes of pancytopenia.

MATERIALS AND METHODS

The present study was carried out on 100 patients in the upgraded Department of Pathology, Osmania General Hospital, Hyderabad, Telangana, India for 12 months from May 2022 to April 2023. A detailed clinical history and clinical examination were done for all the patients. 2 mL of EDTA anticoagulated blood was collected and processed through a haematology analyzer and all parameters were obtained. Smears were prepared and stained with Leishman stain for reporting. Bone marrow aspiration(BMA) was done for all the patients under local anaesthesia.

- The posterior iliac crest is generally the preferred site for the patient's comfort and safety.
- Films of crushed particles should be made and labelled.
- Dry films should be fixed and stained with a Romanowsky stain and a Perls stain.
- Films should be assessed and reported in a systematic manner using a low power, then intermediate, then high power and oil objective.
- A differential count should be performed. An interpretation of the findings should be given.
- The report of the bone marrow films should include the clinical details, the major features of the blood count, the results of the blood film examination, and the bone marrow findings.

Inclusion criteria: Age 11 to 80 years. Both genders. Cases that were referred from the general medicine department for bone marrow aspiration.

Exclusion criteria: Age below 11 years and above 80 years.

RESULTS

In this study, out of 100 cases, the age of patients ranged from 11 to 80 years with a mean age of 31.8 years with male preponderance (1.5: 1). Most of the patients clinically presented with fever, easy fatiguability and generalized weakness. The most common cause is Megaloblastic Anemia (45%), followed by normal bone marrow study (22%), hypocellular marrow (12%), acute leukaemia (10%), idiopathic thrombocytopenic purpura (6%), Multiple Myeloma (4%), granulomatous disease (1%).

Table 1: Sex distribution in the present study with M: F ratio of 1.5: 1

Sex	Number of patients	Percentage
Male	60	60%
Female	40	40%

Table 2: Age-wise distribution of the patients

Age group	Number of cases
11 – 20	16 (16%)
21 – 30	32 (32%)
31 – 40	18 (18%)
41 – 50	10 (10%)
51 – 60	15 (15%)
61 – 70	04 (4%)
71 - 80	05 (5%)

Table 3: Spectrum of various haematological disorders diagnosed on bone marrow examination

Hematological disorder	No. of cases	Percentage
Megaloblastic Anemia	45	45%
Normal marrow study	22	22%
Hypocellular marrow	12	12%
Acute Leukemia	10	10%
Idiopathic Thrombocytopenic Purpura (ITP)	6	6%
Multiple Myeloma	4	4%
Granulomatous disease	1	1%

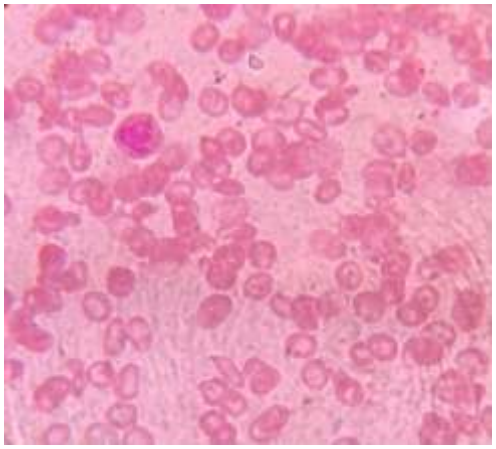

Fig (a) Pancytopenia- blood smear.

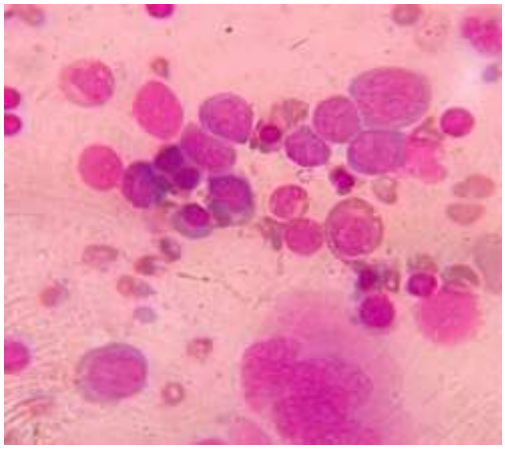

Fig (b) Megaloblastic marrow BMA smear

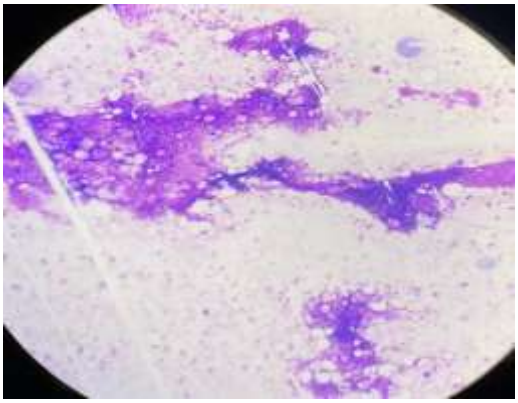

Fig (c) Hypocellular marrow- BMA smear

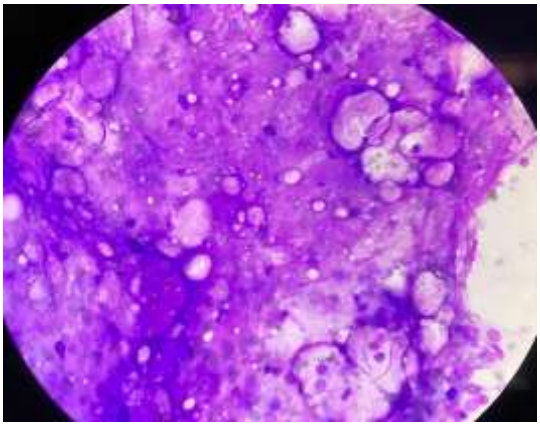

Fig (d) Hypocellular marrow with fat spaces

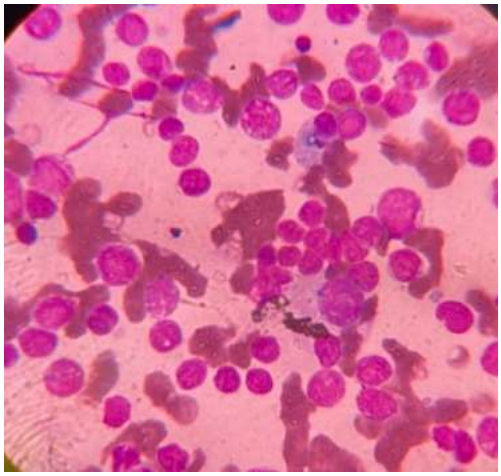

Fig (e) Acute Leukemia on BMA smear

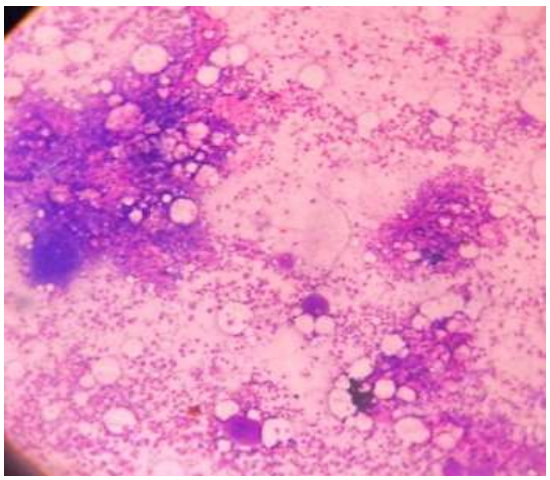

Fig (f) ITP on BMA smear

DISCUSSION

Hematological disorders include a wide range of diseases. BMA plays an important role not only in determining the cause of disease but also in definitive diagnosis.

In the present study of anaemia and pancytopenia patients, the maximum prevalence was seen in the age group 11-80 years similar to Dhana et al. [8] However, Egesie et al [9] in their study found most common

age group was 3-80 years.

In the present study, the male-to-female ratio was 1.5: 1, while the study of Niazi et al [10] found a male-to-female ratio of 1.7 :1.

In this study, the most common cause of anaemia was Megaloblastic anaemia (45%), similar to the studies of Damulak and Damen et al [11] (33%) and Dhana et al [8] (34%), while it was reported as a second most common finding in Pudasaini S et al [12] (12.3%) study which showed erythroid hyperplasia as the commonest finding. In the present study, Megaloblastic anaemia is made in correlation with biochemical and other parameters. BMA could be effectively used in most cases to determine the cause of anaemia and pancytopenia.

In the present study, 12(12%) patients were diagnosed with hypoplastic marrow. Pudasaini et al [12] reported 3(5.3%), and Dhana et al [8] reported 2 (2%) such cases.

In the present study, 10(10%) cases were reported to be Acute Leukaemia. Pathak et al [13] reported 4(3.9%) cases and Pudasaini et al [11] reported 7 cases (12.3%).

In the present study, 6 (6%) cases were reported as Idiopathic Thrombocytopenic Purpura (ITP). Dhana et al [8] reported 2 (2%) cases.

In the present study, 4 (4%) cases reported as multiple myeloma. Dhana et al [8] reported 1 (1%) case and Pudasaini et al [12] reported 2 (3.5%) cases.

In the present study, 22 (22%) cases were reported as normoblastic marrow.

Dhana et al [8] reported 17 (18.1%) cases and Pudasaini et al [12] reported 6 (10.5%) cases.

CONCLUSION:

- Bone marrow aspiration is a safe, easy and cost-effective procedure.
- Bone marrow aspiration gives good cellular details. Whereas bone marrow biopsy is required for confirmation and prognosis of certain haematological diseases.
- Results and accuracy are dependent on the quality of samples and smears.
- Diagnosis is strengthened by correlating peripheral smear with bone marrow aspiration findings, other biochemical investigations and clinical findings.

Megaloblastic anaemia was found in a large number of patients who were found to have pancytopenia and the majority of such patients were found to be deficient in vitamin B12 and folate.

REFERENCES:

1. Dacie JV, Lewis SM, editors. Dacie and Lewis Practical Hematology.8th ed. Edinburgh: Churchill Livingstone; 1994.
2. Sitalakshmi S, Srikrishna A, Devi S, Damodar P, Alexander B. The diagnostic utility of bone marrow trephine biopsies, Indian J Pathol Microbiol 2005;48: 173-6.
3. Mannan R, Manjari M, Sharma S, Bhatia K, Singh G, Bhasin T. Documentation of Myeloproliferative Disorder as the Commonest Hematological Malignancy in Predominant Rural Based Pilot Study at Punjab (India): An Incidental Finding or Association. Annals of Pathology and Laboratory Medicine. 2016;3(3):A237-43.
4. Kar M, Ghosh A. Pancytopenia. J Indian Acad Clin Med 2002;3:29-34.
5. Lee GR, Bithell TC, Forester J, Athens JW, Lukens JN, editors. Wintrobe's Clinical Hematology. 10th ed. Philadelphia: Lee & Febiger, 1999. pp1969-89.

6. Rodak RF. Hematology Clinical Principles and Applications. 2nd ed. Philadelphia: W.B. Saunders Company, 2002:63-94.
7. Pancytopenia. [Online]. 1998 March 20 [cited 1998March 26]; Available from: URL: en.wikipedia.org/wiki/Pancytopenia.
8. MNK Dhanalakshmi, N Sangeetha, I Sheeja. Study of Bone Marrow Aspiration for a Period of Two Years. Indian J Pathol Res Pract 2020;9(2 Part 1)9-15.
9. Egesie OJ, Joseph DE, Egesie UG, Ewuga JO. Epidemiology of anaemia necessitniazi M, Rating bone marrow aspiration cytology in Jos. Niger Med J 2009;50:61-3.
10. Niazi M, Raziq FI. The incidence of underlying pathology in pancytopenia– an experience of 89 cases. JPMI 2004;18:76–9.
11. Damulak OD, Damen JG. Diagnostic outcome of bone marrow aspiration in a new centre in Nigeria. Glob Adv Res J Med Sci 2012; 1:166-71.
12. Pudasaini S, Prasad KBR, Rauniyar SK, Shrestha R, Gautam K, Pathak R et al.Interpretation of bone marrow aspiration in haematological disorders.Journal of Pathology of Nepal 2012;2:265–271.
13. Pathak R, Jha A, Sayami G. Evaluation of bone marrow in patients with pancytopenia. Journal of Pathology of Nepal 2012;2:265–271.