



SPECTRUM OF HAEMATOLOGICAL DISEASES DIAGNOSED BY BONE MARROW EXAMINATION: A ONE YEAR STUDY IN A TERTIARY CARE CENTRE IN NORTH EAST INDIA

Pathology

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ABSTRACT

Introduction- Haematological disorders are quite frequent in all age group. Most of these haematological disorders presents as anaemia. Bone marrow examination plays a major role in the diagnosis of its underlying cause. The aim of this study was to analyse the causes of haematological disorders, its spectrum and to interpret the bone marrow examination findings. **Aims & Objectives -** The aim of this study was to know the spectrum of various haematological disorders diagnosed on bone marrow examination **Material & Methods -** This was a study carried over a period of 1 year from June, 2023 to May, 2024 in the Department of Pathology, Assam Medical College and Hospital, Dibrugarh, Assam. Bone marrow examination was done on patients who were referred with suspected haematological disorders and a total of 120 cases were included in the study. **Results-** 120 cases were included in this study. Out of those cases, 10 were from the paediatric age group and 110 were adults. Male to female ratio was 0.8:1. Most common diseases observed on bone marrow examinations were Erythroid Hyperplasia 16.6% and Plasma Cell Dyscrasia 14% followed by Megaloblastic Anaemia 10.7%. Bone marrow examination yielded a diagnosis of Leukaemia in a total of 13 cases (12.7%). **Conclusion-** Bone marrow examination is a valuable diagnostic tool and aids in diagnosis and etiology of various haematological disorders, like anaemia, pancytopenia including haematological malignancies within a short span of time.

KEYWORDS

Bone Marrow Examination, Leukaemia, Haematological Disorders.

INTRODUCTION

Hematological disorders frequently manifest with anemia across all age groups. It is widespread globally, with a higher incidence in developing countries. The pattern of hematological diseases often differs between developed and developing regions.¹ In many cases, a diagnosis can be made through a thorough clinical examination and basic laboratory investigations. However, in certain situations, a definitive diagnosis may require a bone marrow examination. A combination of bone marrow findings, peripheral blood smear analysis, and clinical features is often essential to reach a conclusive diagnosis.¹

Bone marrow aspiration is important for evaluating cytopenias and helps in diagnosing leukemias. It is also utilized in both the diagnosis and staging of neoplasms, as well as storage diseases.¹ Accurate diagnosis of acute leukemias and lymphomas often requires special stains and immunohistochemistry.²

Aim

The aim of this study was to know the spectrum of various haematological disorders diagnosed on bone marrow examination.¹

MATERIALS AND METHODS

The retrospective study was done at Department of Pathology, Assam Medical College and Hospital, Dibrugarh, Assam over a period of 1 year from June, 2023 to May, 2024.

A total of 120 cases were included. Patient clinical information was gathered from case records, while bone marrow aspiration (BMA) reports were sourced from the bone marrow registry maintained by the Pathology Department. The compiled data were then analyzed using statistical methods.

Bone marrow was aspirated from the posterior iliac spine of each patient using a bone marrow aspiration needle. Prior to the procedure, local anesthesia was administered with 2% lidocaine hydrochloride. Peripheral blood and bone marrow smears were examined using Leishman stain. In cases where bone marrow aspiration resulted in a dry tap or a bloody sample, a bone marrow trephine biopsy was performed as a supplementary procedure. The evaluation of bone marrow was carried out on aspiration smears stained with Leishman stain, as well as on trephine biopsy sections stained with hematoxylin and eosin. The diagnosis of different hematological disorders was established based on standard diagnostic criteria.

RESULTS

Table 1: Sex Distribution in the Present Study

SEX	Number of patients	Percentage
MALE	56	46.7%
FEMALE	64	53.3%

In the present study, Out of 80 cases 56 were male (46.7%) and 64 cases were female (53.3%) with Male:Female ratio of 0.8:1.

Table 2: Age Wise Distribution of the Patients

AGE GROUP	NO OF CASES
1-14	09
15-19	06
20-30	11
31-40	19
41-50	27
51-60	38
61-70	10

In our study, The maximum number of cases (31.6%) were in the age group of 51-60 years, followed by 41-50 years (22.5%).

Table 3: Spectrum of Various Hematological Disorders Diagnosed on Bone Marrow Examination

Disease Pattern	No of Cases	Percentage
Erythroid Hyperplasia	27	22.5 %
Plasma Cell Dyscrasia	16	14%
Megaloblastic Anemia	13	10.7%
Acute Leukemia	09	07%
Chronic Myeloid Leukemia	05	4.1%
Granulomatous Lesions	02	1.6%
ITP	03	2.5%
Metastasis	01	0.8%
Myelofibrosis	01	0.8%
Aplastic Anemia	08	6.6%
Normal Study	18	15%
Hemodiluted Sample	08	6.6%
Hemophagocytosis	02	1.6%
Hypercellular Marrow With Reactive Plasmacytosis	02	1.6%
Hypercellular Marrow With Dysplastic Changes	01	0.8%
Hypocellular Marrow	03	2.5%
Hypoplastic Marrow	02	1.6%
Leukemoid Reaction	02	1.6%
Myelodysplastic Neoplasm	02	1.6%
Pure Red Cell Aplasia	01	0.8%
Erythroid Hyperplasia With Dysplastic Changes With Erythrophagocytosis	02	1.6%

Table 4: Distribution of Non- Malignant Hematological Disorders According to the Age

DISEASE	1-14 yrs	15-20 yrs	21-30 yrs	31-40 yrs	41-50 yrs	51-60 yrs	61-70 yrs	Total Cases
Erythroid Hyperplasia	01	02	05	13	02	01		27
Megaloblastic Anemia	01	01	02	03	02	02	02	13
ITP	02	00	00	01	00	00	00	03
Granulomatous Lesion	00	00	00	01	00	01	00	02
Aplastic Anemia	01	01	01	00	01	02	02	08
Leukemoid Reaction	00	00	00	00	02	00	00	02

Table 5: Distribution of Hematological Malignancies According to the Age and Sex

HEMATOLOGICAL MALIGNANCIES	1-14 yrs	15-20 yrs	21-30 yrs	31-40 yrs	41-50 yrs	51-60 yrs	61-70 yrs	Total
Acute leukemia	02	04	00	01	00	01	00	09
CML	01	00	00	03	02	03	00	07
Multiple Myeloma	00	00	01	09	03	09	02	16
Myelofibrosis	00	00	00	00	01	00	00	01
Metastasis	00	00	00	00	00	01	00	01

In the present study, Erythroid hyperplasia emerged as the most prevalent finding. (22.5%) followed by Plasma cell Dyscrasia noted in 14% of the cases, and then by Megaloblastic Anemia (10.7%). The spectrum of these various hematologic disorders on bone marrow examination in the present study were shown in Table 3. In the current study, a total of 55 cases were diagnosed with non-malignant hematological disorders. Erythroid hyperplasia was the most commonly encountered condition, followed by megaloblastic anemia. 08 cases of Aplastic anemia were also recorded in the present study. This distribution of non malignant hematologic disorders is shown in Table 4. Out of 120 cases studied, hematologic malignancy was found in 34 (28.3%) cases. Plasma cell Dyscrasia was the commonest malignant hematological disorder in the present study constituting to 14% of all cases. The next common malignancies in this study were acute leukemias (7.5%) followed by Chronic Myeloid Leukemia (5.8%). Others were 1 case (0.8)of myelofibrosis and 1case of metastatic secondary deposits. The distribution of hematologic malignancies according to age and sex was shown in table 5.

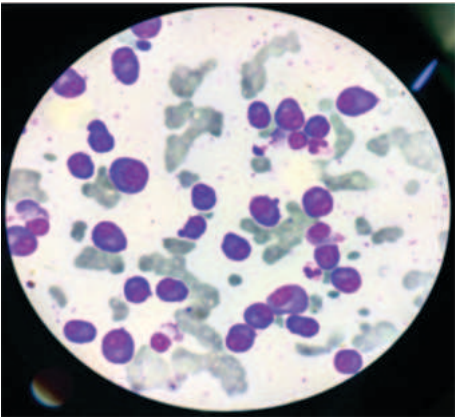


Fig. : Multiple Myeloma (40X : high power)

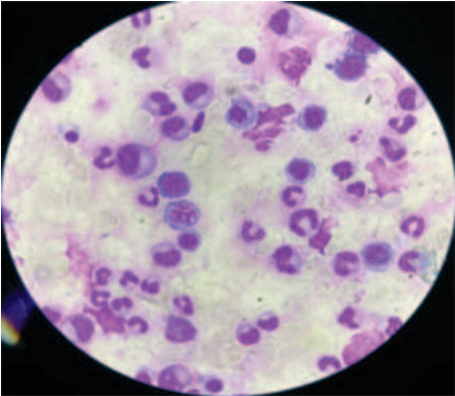


Fig. : Megaloblastic Anemia (40X:High power)

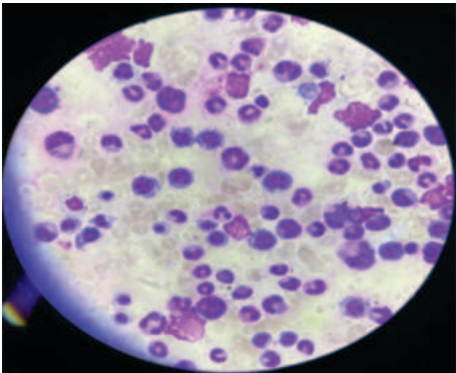


Fig. : Megaloblastic Anemia (40X:High power)

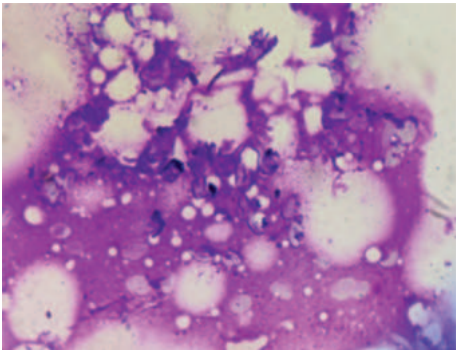


Fig: Aplastic Anemia (BMA)

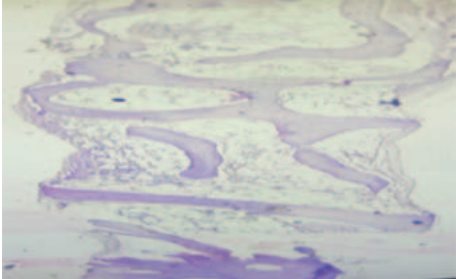


Fig:- Aplastic Anemia (BMB)

DISCUSSION

Hematological disorders are diverse, and bone marrow examination is a safe, widely accessible, and effective tool for definitive diagnosis in majority of cases.

In the present study, out of 120 cases studied, there were 56 males (46.7%) and 64 females (53.3%). The male to female ratio was 0.8:1 . Similar findings was seen in a studies done by Pudasani S et al.³The age of the patients who underwent bone marrow examination ranged from 6 yrs to 70 years .Most common age group was 51 –60 years .

The most common finding in the present study on bone marrow examination was erythroid hyperplasia which was seen in 27 cases (22.5%) Similar findings of erythroid hyperplasia was seen in a studies done by Pudasani S et al³ and by M. Atchyuta et al.¹

The second most common finding in the present study was Plasma cell Dyscrasia (14%) , which is not consistent with findings reported by Pudasani S et al.,³ and Niazi et al. ⁴

In our cohort , hematologic malignancy was found in 34 cases out of 120 cases and constituted to (28.3%) of overall hematologic disorders. According to the studies done by Kumar et al. ⁵, Fazlur Rahman et al. ⁶ ,the hematologic malignancies constituted is 28.41% and 27.12%, respectively.

CONCLUSION

This study highlights the wide range of hematological disorders identified through bone marrow examinations conducted at a tertiary care facility. The findings of this study emphasize the importance and the critical role of both bone marrow aspiration and trephine biopsy in

accurately diagnosing and managing these conditions, as well as in monitoring disease progression. Despite being invasive, these procedures are generally safe and can often be performed in outpatient settings. It provides deeper insight into the underlying pathology of various hematological conditions. With evolving clinical practices, bone marrow examinations are increasingly being utilized for additional tests such as flow cytometry, immunohistochemistry, and molecular studies.

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