



HEMATOLOGICAL AND NON-HEMATOLOGICAL DISORDERS DIAGNOSED ON BONE MARROW EXAMINATION IN TERTIARY CARE CENTER.

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ABSTRACT **Background:** Haematological disorders are quite frequent in population than non-haematological disorders. Most of the times the diagnosis can be arrived by clinical examination and few simple investigations. However, without bone marrow examination the diagnosis is not confirmed. Bone marrow examination is one of the most frequent and relatively safe invasive procedure for diagnosis of haematological and non-haematological diseases, typing of anaemia, evaluation of pyrexia of unknown origin and infective diseases. **Materials And Methods:** The hospital based observational cross-sectional study conducted in department of pathology in tertiary care centre during the period of January 2020 to June 2021. Total 92 bone marrow examination done. Clinical data with reference to age, sex, and presenting complaints were recorded. **Result:** among 92 cases studied, age of patients ranged from 4 months to 77 years with male predominance (M:F ratio 1.1:1). Most common presenting complaint was generalized weakness (94%.6) followed by pallor (76.1%). Most common indication of bone marrow examination was pancytopenia (42.39%). Majority of cases found were nutritional anaemia (59.78%) followed by acute leukaemia (16.3%). Most common benign haematological disorder was megaloblastic anaemia (23.9%) while most common malignant disorder observed in study was AML (10.86%). Out of 92 cases, only 2 cases were diagnosed as a nonhematological disorders, among which one was granulomatous disease (1%) and second was storage disorder (1%). **Conclusion:** bone marrow examination is an important tool in establishing the diagnosis in various haematological and nonhematological disorders.

KEYWORDS : bone marrow examination, haematological disorders, nonhematological disorders

INTRODUCTION:

Haematological disorders are quite frequent in population than non-haematological disorders. Bone marrow aspiration and biopsy is useful in the diagnosis of both haematological and non-haematological disorders. Bone marrow examination is one of the most frequent and relatively safe invasive procedure for diagnosis of hematological and non hematological diseases, typing of anemia, evaluation of pyrexia of unknown origin and infective diseases. These procedures are also valuable for follow up of patients undergoing chemotherapy, bone marrow transplants and other forms of medical treatment^{1,2}. Bone marrow aspiration alone is usually sufficient to diagnose nutritional anaemias, most of the acute leukaemias and immune thrombocytopenia. Trepine biopsy does provide important diagnostic information in patients with granulomatous disease, myelofibrosis, and bone marrow infiltration³. For bone marrow interpretation the history, clinical findings, peripheral blood picture and other laboratory findings are required⁴. Bone marrow aspiration is useful in making out better individual cell morphology. Whereas biopsy is useful in bone marrow architectural pattern and distribution⁵. Various indications for bone marrow examination include proper diagnosis, staging and therapeutic monitoring of different haematological and non-haematological disorders like lymphoma proliferative disorders, such as chronic lymphocytic leukaemia, Hodgkin's and non-Hodgkin's lymphoma, hairy cell leukaemia, myeloproliferative disorders, and plasma cell dysplasia like multiple myeloma respectively⁶.

AIM OF STUDY:

To find out and diagnose the spectrum of haematological and non-haematological disorders on bone marrow examination.

MATERIALS AND METHODS:

The hospital based observational cross-sectional study conducted in department of pathology, Dr. Panjabrao Deshmukh Memorial Medical College, Amravati, during the period of January 2020 to June 2021. The bone marrow examination was carried out in the group of patients who were referred to the pathology department for unexplained anaemias, pancytopenia, haematological malignancies, leukaemia, or thrombocytopenia. Total 92 bone marrow examination done. Clinical

data with reference to age, sex, and presenting complaints were recorded. Peripheral blood smears, complete blood count and haematological parameters were performed prior to bone marrow aspiration. Written consent was taken from the patients. An aspirate smear and trephine slides were prepared and stained. The slides observed under the microscope and findings were noted.

Statistical Analysis:

The data will be collected and entered in Microsoft excel and analysed by Statistical Packaging for Social Sciences (SPSS). Mean was calculated for quantitative variables. Frequencies and percentages were calculated for qualitative variables.

RESULTS:

A total 92 patients underwent bone marrow examination during the period of January 2020 to June 2021, among 92 cases, 49 (53.3%) were male and 43 (46.7%) were females with male to female ratio of 1.1:1 and this gender ratio shown in table 1.

Table 1: Gender Wise Distribution Of Cases

SEX	NO OF CASES	PERCENTAGE
Male	49	53.3 %
Female	43	46.7%
Total	92	100 %

In present study, age group of patients was between 4 months to 77 years with mean age was 37.4 years. Maximum number of cases 19(20.65%) were in the age group of 11-20 years followed by 16(17.39%) were in 61-70 years while lowest 2(2.17%) found in >70 years of age. Table 2 shows the age distribution.

Table 2: Age Wise Distribution Of Patients

AGE GROUPS	TOTAL NUMBER OF CASES	PERCENTAGE
<10 YEARS	10	10.86%
11-20 YEARS	19	20.65%
21-30 YEARS	8	8.69%

31-40 YEARS	15	16.30%
41-50 YEARS	11	11.95%
51-60 YEARS	11	11.95%
61-70 YEARS	16	17.39%
>70 YEARS	2	2.17%
Total	92	100%

In present study, Major presenting complaint was generalized weakness (94.6%) followed by pallor (76.1%), fever (35.8%) and splenomegaly (19.5%). The most common indication for bone marrow examination was pancytopenia 39(42.39%) followed by bicytopenia 18(19.56%), anaemia 17 (18.47%) and haematological malignancies 16(17.39%).

Among benign hematological diseases, Erythroid hyperplasia 33(35.68%) was most common finding in present study followed by megaloblastic anemia 22 (23.9%) and aplastic anemia 7 (7.6%). One case of ITP diagnosed on bone marrow.

Out of total cases, hematological malignancy was found in 20 cases, among which acute leukemia of was the commonest malignant disorder in present study 16.3% of overall cases and 75% of malignancies. Among leukemias, acute myeloid leukaemia diagnosed in maximum number of cases 10(10.86%) followed by acute lymphoblastic leukaemia 5 (5.43%), myeloproliferative disorders in 3 cases (3.2%), Chronic lymphoproliferative disease (1%) in one case and multiple myeloma in one case (1%).

There were only 2(2.1%) cases of nonhematological disorders diagnosed on bone marrow. Among them one case (1%) of storage disorder and one case (1%) of granulomatous disease seen in present study.

In present study 2 cases were shown normal study and 3 cases were having inadequate diagnosis.

Table 3 shows spectrum of hematological and non-hematological disorders diagnosed on bone marrow.

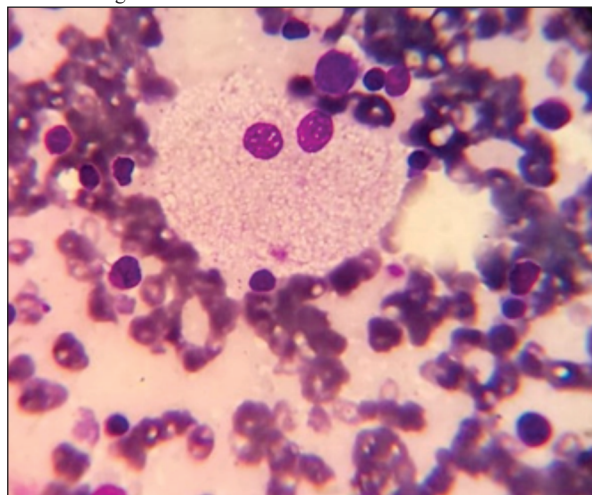


Fig 1: Storage Disorder Showing Large Macrophage With Foamy Cytoplasm

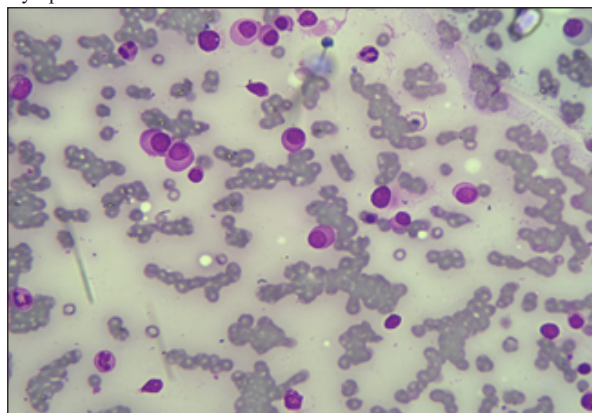


Fig 2: Bone Marrow Aspiration Of Multiple Myeloma Showing Plasma Cells

Table 3: Spectrum Of Hematological And Nonhematological Disorders

DISORDERS	NUMBER OF CASES	PERCENTAGE %
Megaloblastic anemia	22	23.9%
Erythroid hyperplasia	33	35.86%
Acute leukemia	15	16.3%
Lymphoproliferative disorders	1	1%
Myeloproliferative disorders	3	3.2%
Plasma cell dyscrasias	1	1%
Aplastic anemia	7	7.6%
Platelet disorders	1	1%
Eosinophilia	2	2.1%
Granulomatous diseases	1	1%
Storage disorders	1	1%
Normal study	2	2.1%
Inadequate	3	3.2%
Total	92	100%

Majority of marrow received were hypercellular marrow (72.82%) followed by normocellular marrow (15.21%) and then hypocellular marrow (11.95%)

DISCUSSION:

As bone marrow examination is a safe invasive procedure, therefore it has become an important routine investigation for the diagnosis of various haematological and non-hematological disorders. Both BMA and BMTB are important for diagnosis of many hematological and non-hematological diseases, assessment of pyrexia of unknown origin, typing of anemia and infectious diseases. They also help in follow up of patient taking chemotherapy, bone marrow transplantation.

In present study, total 92 cases included with M:F ratio of 1.1:1 and with mean age of 37.4 years and most common affect group was 11-20 years compared with study conducted by M.Atchya et al⁷ which mean age was 39.1 years and most common age group affected 31-40 years which is slightly higher than present study.

Most common indication of bone marrow examination was pancytopenia (42.39%) and most common disorder associated with pancytopenia was megaloblastic anemia (19.56%) followed by aplastic anemia (6.5%) which is similar with studies conducted by Dr.Prasanna kumar⁸ and rajan et al⁹.

In present study, commonest hematological disorder was erythroid hyperplasia (35.86%) followed by megaloblastic anemia (23.9%) and among malignancies, AML was most common disorder (10.86%), similar findings seen in M Atchya et al⁷ and shastri and kolte¹⁰.

There was one male child diagnosed with storage disorder on bone marrow aspiration. So, bone marrow aspiration is helpful in making primary diagnosis of storage disorder in majority of pediatric cases.

There was one case of granulomatous disease diagnosed on bone marrow biopsy, on aspiration it was given as a normal study. And a case of dry tap on aspiration diagnosed as a myelofibrosis on bone marrow biopsy. Hence, bone marrow biopsy is a better procedure to detect granuloma and confirmation of diagnosis of myelofibrosis which is similar with study conducted by Manjit kaur et al¹¹ and Ch Toi P et al¹².

CONCLUSION:

Bone marrow examination plays important role in diagnosis of various hematological and non-hematological disorders. Spectrum of diagnosis of bone marrow examination ranged from malignant hematological diseases, benign hematological diseases to non-hematological diseases like storage disorders. BMA and BMB should be done simultaneously as they play important role in providing findings, which are mandatory for making final diagnosis. Bone marrow examination can be performed routinely and does not require any specialized equipment. The study clearly demonstrated the usefulness on bone marrow examination in various hematological and non-hematological disorders.

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