

Prospective Study of Bone Marrow Aspiration in Haematological Disorder

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Abstract: Background: Bone marrow examination is valuable in diagnosis of various haematological and nonhaematological disorders. Bone marrow aspirate smears are ideal for the study of cytological details of haematopoietic cells. The purpose of this study is to acknowledge the prevalence of haematological disorders commonly diagnosed using this procedure. Material and methods: The present study was prospective study of 4 month duration conducted in the Department of Pathology Pt. J.N.M. Medical College and associated Dr B.R.A.M Hospital Raipur (C.G). A total 115 cases were included in study. Records regarding the clinical indication for the procedure, peripheral blood smear reports, blood counts and significant findings on bone-marrow aspiration examination were studied. Result: During the study period of 4 month, 115 cases of bone marrow aspiration fulfilling the inclusion criteria were included in the study. Male female ratio in our study was 1.8: 1. The age ranges were from 3 month to 80 years. Mean age was 40 years. Most of the cases had hypercellular marrow (48.6%) followed by normocellular (33.9%) and hypocellular (17.3%). Most common finding in our study was erythroid hyperplasia (21.8%). Megaloblastic anemia was most common anemia (4.3%). Single case (0.8%) of autoimmune haemolytic anemia was reported. Next most common finding was acute leukemia. Out of 24 cases, (20.9%), 14 cases, (12.1%) were of acute myeloid leukemia and 10cases, (0.8%) were of acute lymphoblastic leukemia. 14cases, (12.9%) of chronic myeloid leukemia reported. 4cases, (3.5%) of multiple myeloma were reported. Among cases received for staging in lymphoma 3cases, (2.7%) were positive for infiltration. 18(15.6%) cases were nonconclusive and 20cases, (17.4%) were normal. Conclusion: It is an important step not only for confirmatory diagnosis of haematological disorder but also useful for prognosis and therapeutic evaluation of disease. These are also helpful in planning further investigations and management.

Keywords: Bone marrow aspiration, haematological disorder, pancytopenia

1. Introduction

Bone marrow examination is extremely helpful in evaluation of pancytopenia. Bone marrow examination is one of the most frequent and relatively safe invasive procedures done routinely in the hospitals for diagnosis and management of haematological disorders^{1,2}. Though an invasive procedure, it can be easily performed even in the presence of severe thrombocytopenia with little or no risk of bleeding¹. This allow complete assessment of marrow architecture and the pattern of distribution of any abnormal infiltrate and for the detection of focal bone marrow lesion.

The purpose of this study is to acknowledge the prevalence of haematological disorders commonly diagnosed using this procedure.

2. Material and Methods

The present study was conducted in the Department of Pathology Pt. J.N.M. Medical College and associated Dr. B.R.A.M Hospital Raipur (C.G). It was a prospective observational hospital based study for a period 4 months (January 2018 to April 2018). A total 115 cases were included in this study. Case selection was based on the clinical feature and supported by laboratory evidence of pancytopenia. Bone marrow aspiration ordered due to pancytopenia was studied. Detail haematological investigation were performed on each patient by automated analyzer. Hematological investigation done by automated analyzer also cross checked by peripheral blood smear examination for which leishman stain was used. The bone marrow findings were correlated with clinical presentation and haematological parameter of patients.

3. Result

During the study period of 4 month, 115 cases of bone marrow aspiration fulfilling the inclusion criteria were included in the study. Male female ratio in our study was 1.8: 1. The age ranges were from 3 month to 80 years. Mean age was 40 years. Table number 1 shows the age distribution of the patient. Table number 2 shows cellularity of various bone marrow aspirates. Most of the cases had hypercellular marrow (48.6%) followed by normocellular (33.9%) and hypocellular (17.3%). Table number 3 shows various bone marrow aspiration findings. Most common finding in our study was erythroid hyperplasia (21.8%). Megaloblastic anemia was most common anemia (4.3%). Single case, (0.8%) of autoimmune haemolytic anemia was reported. Next most common finding was acute leukemia. Out of 24cases, (20.9%); 14 cases, (12.1%) were of acute myeloid leukemia and 10cases, (0.8%) were of acute lymphoblastic leukemia. 14cases, (12.9%) of chronic myeloid leukemia reported. 4cases, (3.5%) of multiple myeloma were reported. Among cases received for staging in lymphoma 3cases, (2.7%) were positive for infiltration. 18cases, (15.6%) were nonconclusive and 20cases, (17.4%) were normal.

4. Observation

Table 1: Age distribution of the patients

Age Group	Number of patients	Percentages
< 15 yrs	32	27%
15-30 yrs	18	15.6%
31- 45 yrs	21	18.2%
>45 yrs	44	38.2%

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Table 2: Cellularity of the bone marrow in the aspirated smears

Cellularity	No.of cases	Percentage
Hypocellular	20	17.3
Normocellular	39	33.9
Hypercellular	56	48.6
Total	115	100%

Table 3: Bone marrow examination findings

BM Diagnosis	No of cases	Percentage%
Normal study	20	17.4
Erythroid hyperplasia	25	21.8
Nonconclusive	18	15.6
Acute leukemia	24	20.9
Multiple myeloma	4	3.5
Chronic myeloid leukemia	14	12.9
Lymphoma	3	2.7
AIHA	01	0.8
Megaloblastic hyperplasia	05	4.3
Total	115	100

Table 4: Comparison of age and sex distribution of different study

Study	Age	M:F
Shilpa et al ⁵	3 years-70 years	2.4:1
Ansari et al ⁶	4 month -90years	1.4:1
Niazi et al ⁸	1year-75 years	1.7:1
Present study	3month -80 years	1.8:1

5. Discussion

The spectrum of haematological disorder is very wide. Bone marrow examination is not only useful for haematological disorder but also for non haematological disorder. These procedures is also useful for follow up of the patient undergoing chemotherapy^{3,4}. In our study most common age group undergoing bone marrow aspiration was above 45-80 years. Which is quite similar to study done by Shilpa et al and Ansari et al^{5,6}. In present study male female ratio was 1.8:1 which is almost similar to study done by Niazi et al⁷. Bone marrow cellularity varies depending upon the cause. Marrow is hypocellular in primary production defect while in case of ineffective erythropoiesis, increased peripheral utilization or destruction of cell and bone marrow with malignant infiltration are associated with hypercellular and normocellular marrow⁸. In present study most of the cases had hypercellular marrow (48.6%) followed by normocellular marrow (33.9%) and hypocellular marrow (17.9%). Which is quite comparable with study done by Pudasaini S et al¹.

In our study most common finding was erythroid hyperplasia as 25 cases, (21.7%) which is almost similar to study done by Sreedevi et al⁹ and Pudasaini S et al. In our study megaloblastic anemia was seen in 05 cases, (4.3%). In other study conducted by Khoddke K et al¹⁰ and Khan SP et al¹¹ 6.5% and 14.5% cases of megaloblastic anemia were reported respectively.

In our study acute leukemia was reported in 24 cases, (20.8%). Similar finding was also seen by Khan SP et al¹¹ as 22.3% cases. Out of 24 cases 14 case, (12.1%) were of AML and 10 cases, (8.6%) were of ALL. Other studies also shows that acute leukemia is most common malignancy and AML

is more common than ALL^{1, 2, 12, 13}. Cytogenetic and flowcytometry were advised to confirm the diagnosis.

Other malignancy in our study was chronic myeloid leukemia reported as 14 cases, (12.1%). Ansari et al⁶ reported 10cases, (0.49%) of CML. There were 4 cases, (3.4%) of multiple myeloma. Pudasaini S et al¹ also reported 3.5% cases of multiple myeloma in their study. We received 9 cases of lymphoma for staging. Out of 9 cases, 3 cases (2.6%) were showing infiltration. Ansari et al⁶ reported only 1 case of Hodgkin lymphoma. Normal marrow study was seen in 20 cases, (17.4%). Normal marrow study was seen in 3.8% cases in the study of Atla et al¹⁴ and 10.5% cases in study done by Pudasaini S et al¹.

6. Conclusion

Bone marrow aspiration examination is safe procedure and can be done as OPD procedure. It is an important step not only for confirmatory diagnosis of haematological disorder but also useful for prognosis and therapeutic evaluation. These are also helpful in planning further investigations and management.

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