



Full Length Research Article

ROLE OF BONE MARROW EXAMINATION IN VARIOUS HEMATOLOGICAL AND NON HEMATOLOGICAL DISORDERS

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ABSTRACT

Background: Bone marrow is involved in various hematological and non hematological disorders. Therefore, bone marrow examination is required to analyse the underlying etiology.

Materials and Methods: A retrospective study was carried out in the department of Pathology, Government Medical College Rajkot, Gujarat (India) from January 2013 to June 2015. Bone marrow aspiration was done in 112 patients for various suspected hematological disorders.

Results: Out of 112 cases of bone marrow aspiration, maximum cases were of Megaloblastic Anemia (38.4%) followed by Erythroid Hyperplasia (21.4%). 4.36% cases were of diluted bone marrow and 1.78% cases were of dry aspirate.

Conclusion: Bone marrow examination is an important tool in establishing the diagnosis in various hematological and non hematological disorders.

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INTRODUCTION

Bone marrow examination is quite useful in arriving at a particular diagnosis in various hematological and non hematological disorders. Various hematological disorders where bone marrow examination are unexplained cytopenias, acute blastic leukemia, lymphoproliferative disorders (such as lymphomas, hairy cell leukemia and multiple myeloma) and in various myeloproliferative disorders. Non hematological disorders where bone marrow examination can provide an exact diagnosis are granulomatous lesions, storage diseases, metastatic diseases and various systemic infections (Bain *et al.*, 2010). Bone Marrow Aspiration is the most common invasive procedure performed in various hospitals in establishing the diagnosis and in management of various disorders. It is a safe invasive procedure with a low to none risk of bleeding, therefore it is quite safe even in cases of severe thrombocytopenias (Kibria *et al.*, 2010).

MATERIALS AND METHODS

A retrospective study is done in the Department of Pathology, Government Medical College, Rajkot, Gujarat from January 2013 to June 2015. A total of 112 cases are included in this study. Along with Bone Marrow Aspiration findings, Peripheral Blood Smear examination and other clinical parameters were also noted. Leishman stained slides along with special stained slides [eg.PAS (Periodic Acid Schiff), MPO (Myeloperoxidase), Sudan Black and Prussian Blue] were studied. Diluted Marrow aspirates and dry aspirates were also included in the study. Data was collected manually and was subsequently analyzed.

RESULTS

Patients who were included in the study aged between 2.5 years to 72 years. Maximum number of patients who underwent Bone Marrow Aspiration were in the age group of 35 to 50 years. Marrow was Hypercellular in maximum number of cases (77.6%) (Table 1). In our study maximum number of cases were of Megaloblastic Anemia (38.4%) followed by Erythroid Hyperplasia (21.4%) (Table 3).

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Megaloblastic anemia (38.4%) was more common than Microcytic Anemia (2.7%). Acute Blastic Leukemia cases accounted for 11.6%, out of them Acute Myeloblastic Leukemia (AML) was commonest.

Table 1. Bone Marrow Cellularity in Aspirates

Marrow Cellularity	Percentage
Hypercellular	77.6%
Normocellular	11.97%
Hypocellular	10.43%

Table 2. Bone Marrow Aspiration Findings

BMA Diagnosis	No. of cases
Megaloblastic Anemia	43
Erythroid Hyperplasia	24
Acute blastic Leukemia	13
MGUS	02
Myeloproliferative Disease	04
Hypoplastic Marrow	06
Granulomatous Osteomyelitis	02
P.Falciparum Infestation	01
MDS	01
Lymphoproliferative lesion	04
Microcytic Anemia	03
Idiopathic Thrombocytopenia	01
Essential Thrombocythemia	01
Dry aspirate	02
Diluted Marrow	05
TOTAL NO. OF CASES	112

Table 3. Percentage of cases diagnosed on Bone marrow aspiration

BMA Diagnosis	Percentage of cases
Megaloblastic Anemia	38.4
Erythroid Hyperplasia	21.4
Acute blastic Leukemia	11.6
MGUS	1.78
Myeloproliferative Disease	3.6
Hypoplastic Marrow	5.4
Granulomatous Osteomyelitis	1.78
P.Falciparum Infestation	0.9
MDS	0.9
Lymphoproliferative lesion	3.6
Microcytic Anemia	2.7
Idiopathic Thrombocytopenia	0.9
Essential Thrombocythemia	0.9
Dry aspirate	1.78
Diluted Marrow	4.36

Infections accounted for 3.57% cases, out of them 2 cases were of Granulomatous Osteomyelitis, 1 case was of Plasmodium Falciparum Infestation and 1 case was of Viral etiology. Hypocellular marrow was identified in 10.43% cases out of those, out of those 1 case was of Hypoplastic marrow with Gelatinous changes. 1 case (0.9%) of Myelodysplastic Syndrome (MDS) was identified. 2 cases (1.78%) of Monoclonal Gammopathy of Undetermined Significance (MGUS) were noted. 1 case (0.9%) each of Idiopathic Thrombocytopenia (ITP) and Essential Thrombocythemia (ET) were identified. In 5 cases (4.36%) diluted marrow was obtained and in 2 cases (1.78%) there was dry aspirate.

DISCUSSION

As Bone marrow aspiration is a safe invasive procedure, therefore it has become an important routine investigation for the diagnosis of various hematological and non hematological disorders. The most common indication for Bone Marrow Aspiration was Pancytopenia (47.3%). Pancytopenia was also the commonest indication in a study done by Ahmed *et al.* (2011). According to our study, the commonest hematological disorder was Megaloblastic Anemia (Tejindersingh, 2011). This finding can be justified by the fact that maximum population of Gujarat is vegetarian, so vitamin B12 deficiency is quite common among them. Acute Blastic Leukemia cases accounted for 11.6%, out of them Acute Myeloblastic Leukemia (AML) was commonest. Other studies also showed that Acute Myeloblastic Leukemia (AML) was the commonest subtype (Gayathri and Rao, 2011; Jha *et al.*, 2008). 6 cases of Hypoplastic marrow were identified out of them 1 case was of Hypoplastic marrow with gelatinous changes. Infections accounted for 3.57% cases, out of them 2 cases were of Granulomatous Osteomyelitis, 1 case was of Plasmodium Falciparum Infestation and 1 case was Viral etiology. This finding differs from other studies (Santhra *et al.*, 2010), in which Leishmaniasis was the commonest infective pathology. Leishmaniasis is not common in western part of India.

Conclusion

Bone Marrow Examination is an important step in arriving at definitive diagnosis and in the management of various Hematological and Non Hematological Disorders. The most common indication for Bone Marrow Aspiration was Pancytopenia (47.3%). In our country most common cause of Pancytopenia is Megaloblastic Anemia which matches well with the findings of our study.

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