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DIAGNOSTIC IMPORTANCE OF BONE MARROW ASPIRATION IN HEMATOLOGICAL DISORDERS – TERTIARY CARE CENTRE BASED STUDY.

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Abstract

Background: Bone marrow aspiration (BMA) is a minimally invasive technique performed in a variety of hematological disorders. It is considered essential for the diagnosis and management of haematological disorders. BMA is usually sufficient to diagnose nutritional anemia and most of the leukemias.

Aims & Objectives: To study the spectrum of hematological disorders diagnosed on BMA in a tertiary care centre, Udaipur.

Material & Methods: The present study was conducted in the hematology section of department of Pathology, RNT Medical College & MB Hospital, Udaipur for a period of one year from June 2018 to May 2019. A total of 123 cases of suspected hematological disorders underwent the process of BMA from posterior superior iliac spine under local anesthesia. Exclusion criteria of our study included aspirates of dry tap. BMA smears were stained with Giemsa stain for morphologic examination.

Result: The present study included 123 cases. Male to female ratio in our study was 1.6:1. Anemia (45.5%) was the most common hematological disorder in our study, iron deficiency anemia being the most common followed by megaloblastic anemia. Chronic myeloid leukemia (26.01%) was the most common hematological malignancy in our study.

Conclusion: Bone marrow aspiration is a useful diagnostic procedure in hematological practice for the diagnosis of both hematological and non-hematological conditions. Rapid and early diagnosis of malignancies are critical for proper initiation of treatment and to control the disease.

Keywords: Bone Marrow Aspiration, Hematological disorders, Leukemias

Introduction

Bone marrow examination holds diagnostic importance in both hematological & non-hematological cases. The hematological disorders include Acute leukemia, Myeloproliferative neoplasm, Lymphoid neoplasm, nutritional deficiency anemia whereas non-hematological disorders include infectious disease infiltrating the bone marrow such as Tuberculosis, parasitic infections & metabolic deposits [1]. The two most important techniques used for the diagnosis of hematological disorders are BMA & Trephine Biopsy. BMA is a minimally invasive procedure whereby spongy bone marrow is obtained through a needle aspiration for diagnostic evalution[2,3,4,5]. Although peripheral blood picture is studied in all the cases of hematological disorders, however, peripheral blood findings alone do not reflect the nature of the disease process. Depending upon the diagnosis suspected from clinical feature & peripheral blood findings , bone marrow examination is indicated [6]. BMA samples are also useful in further diagnostic assays including special staining, immunophenotyping, cytogenetic studies and molecular studies [2,3,7]. The objective of our study was to understand the spectrum of hematological disorders in our tertiary care centre.

Material & Methods:

The present study was conducted in the hematology section of department of Pathology, RNT Medical College & MB Hospital, Udaipur for a period of one year from June 2018 to May 2019. Informed written consent was taken from each patient before performing Bone Marrow Aspiration. A total of 123 cases of suspected haematological disorders underwent the process of BMA from posterior superior iliac spine under local anesthesia. Exclusion criteria of our study included aspirates of dry tap. BMA smears were stained with Giemsa stain for morphologic examination.

Results:

Out of 123 cases included in our study, 77 cases (62.6%) were male and 46 cases (37.4%) were female. Male to female ratio was 1.6:1 as shown in the Table 1.

Table 1: Gender wise distribution of the cases.

GENDER	NO. OF CASES	PERCENTAGE (%)
MALE	77	62.6
FEMALE	46	37.4
TOTAL	123	100

In a total of 123 cases, maximum cases 26 (21.13%) were in 31-40 years age group (fourth decade). The age group ranged from 1 year to a maximum of 77 years with a mean age of 36.2 years as depicted in table 2.

Table 2: Age wise distribution of the cases.

AGE GROUP (YEARS)	NO. OF CASES	PERCENTAGE (%)
0-10	25	20.32
11-20	22	17.88
21-30	13	10.56
31-40	26	21.13
41-50	18	14.63
51-60	14	11.38
61-70	4	3.25
>70	1	0.81
TOTAL	123	100

Based on the clinical findings of the patients, pallor and weakness were the most common presentation. In our study, 92 (74.79%) cases complained of pallor and weakness, 40.65% cases had fever, 33.33% cases presented with hepatomegaly/splenomegaly, 16.26% cases had lymphadenopathy and 5.69% cases presented with bleeding complaints mainly epistaxsis, ecchymosis and mucosal bleeding as shown in table 3.

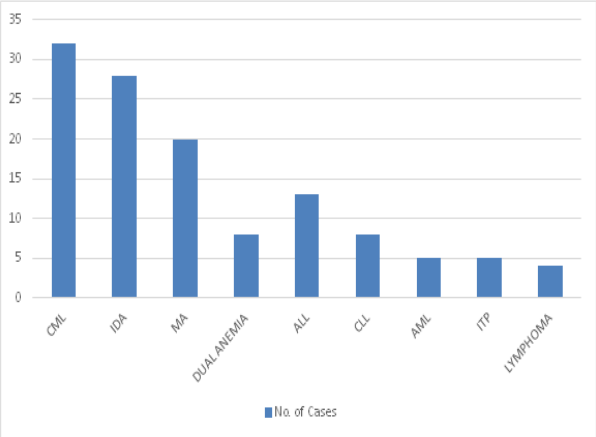
Table 3: Clinical Presentation of the cases.

CLINICAL FINDINGS	NUMBER OF CASES	PERCENTAGE (%)
FEVER	50	40.65
PALLOR & WEAKNESS	92	74.79
HEPATOMEGALY/ SPLENOMEGALY	41	33.33
LYMPHADENOPATHY	20	16.26
BLEEDING MANIFESTATION	7	5.69

Out of 123 cases examined on bone marrow aspiration, the most common haematological disorder was anemia, found in 56 cases (45.5%). 28 cases (22.76%) out of 56 cases were found to have iron deficiency anemia, followed by 20 cases (16.26%) of megaloblastic anemia out of 56 cases and 8 cases (6.5%) had dual deficiency anemia. Chronic myeloid leukemia was seen in 32 cases (26.01%) being the most common hematological malignancy in our study followed by Acute lymphoblastic leukemia in 13 cases (10.57%). Chronic lymphocytic leukemia were diagnosed in 8 cases (6.52%), Acute myeloid leukemia was seen in 5 cases (4.07%). Idiopathic thrombocytopenic purpura and lymphoma were diagnosed in 5 cases (4.07%) and 4 cases (3.25%) respectively as depicted in table 4 and graph 1.

Table 4: Bone Marrow Diagnosis of the cases.

BONE MARROW DIAGNOSIS	NO. OF CASES	PERCENTAGE (%)
CML	32	26.01
IRON DEFICIENCY ANEMIA	28	22.76
MEGALOBLASTIC ANEMIA	20	16.26
DUAL DEFICIENCY ANEMIA	8	6.50
ALL	13	10.57
CLL	8	6.52
AML	5	4.07
ITP	5	4.07
LYMPHOMA	4	3.25
TOTAL	123	100



Graph 1: Graphical representation of the diagnosis on Bone marrow aspiration.

DISCUSSION:

Bone Marrow examination is considered quintessential in diagnosing certain hematological disorders. In our study, cases of age group ranging from 1-77 years were included with the mean age of 36.2 years. Male to female ratio was 1.6:1. Niazi et al, Adewoyin AS et al in their study also reported male predominance in their studies [8,9]. Anemia was the most common hematological disorder in our study similar to the findings of the study done by Khan SP et al, Gohil M et al and Shastry SM et al [10,11,12] , Iron deficiency anemia was the most common followed by megaloblastic anemia. Among hematological malignancies, chronic myeloid leukemia was the most common finding similar to the study conducted by Bordia S et al [13] followed by acute lymphoblastic leukemia, chronic lymphocytic leukemia and then acute myeloid leukemia. The study conducted by Gohil M et al [11] showed acute lymphoblastic leukemia to be the most common hematological malignancy whereas study conducted by Ranabhat S et al [14] found acute myeloid leukemia to be the most common hematological malignancy. Cytogenetic and flow cytometric analysis were advised to classify leukemia based on WHO classification system. We also reported 5 cases (4.07%) of idiopathic thrombocytopenic purpura in our study, other studies showed 6.21%, 6.8% and 5% cases of ITP respectively in their studies [15,16,17]. 4 cases of lymphoma were also included in our study. Most of the patients in our study presented with pallor and weakness followed by fever, hepatomegaly/splenomegaly, lymphadenopathy and bleeding manifestations.

Bone marrow aspirate is an important step to arrive at the confirmatory diagnosis of wide varieties of hematological disorders. It gives a complete picture that cannot be gained from the peripheral blood smear alone [15].

CONCLUSIONS:-

Bone marrow aspiration is a useful, rapid, easy and cost effective diagnostic procedure in hematological practice for the diagnosis of both hematological and non-hematological conditions. The study provides a valuable insight into the causes of anemia or pancytopenia. It plays a significant role in the proper initiation of treatment, control and cure of the disease . Bone marrow examination is also useful for the follow up of the patients undergoing chemotherapy.

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