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Diagnostic Role of Bone Marrow Aspiration In Evaluation of Hematological Disorders – A Study of 344 Cases.

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Abstract: *Aim of the study: The study was done to know the spectrum of cases presenting with hematological and non hematological disorders which are diagnosed by bone marrow aspiration. Materials and Methods: This was a 2 1/2 years retrospective study of bone marrow aspiration done on patients with hematological disorders in department of pathology Rangaraya medical college kakinada from January 2015to june 2017.All details of patients were obtained from the record file in the department of pathology.Results:Bone marrow aspiration from 344 patients were analyzed. Nutritional anemia contributed highest number of cases among hematologicnon malignant cases.Acute myeloid leukemia was the commonest malignant hematological disorder in present study.Among 344 cases 174 cases were males and 170 cases were female patients with highest number of casesin the age group of 0-10years. Conclusion: Although bone marrow examination is an invasive procedure this is well tolerated by patients. The examination helps in many cases to arrive at a final diagnosis within a short span of time.*

Keywords*; Bone marrow aspiration, hematological disorders.*

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I. Introduction

Bone marrow aspiration (BMA) examination is one of the most frequent and relatively safe invasive procedure. Though an invasive procedure it can be easily performed even in the presence of thrombocytopenia with little or no risk of bleeding.[1,2].Biopsy of bone marrow is an adjunct to the study of hematological disorders which are quite frequent in all age groups.[3] The spectrum of hematological disorders is relatively different in the developing world than the developed countries.[4] Commonly it is done for the evaluation of unexplained cytopenias and malignant conditions like leukemia. Bone marrow examination is also at times done for the diagnosis or staging of a neoplasm and storage disorders.

This study was carried out with aim of finding out the etiological spectrum of disorders as diagnosed on bone marrow examination and to know the age incidence and male to female ratio.

II. Materials And Methods

This was a retrospective study done in department of pathology Rangaraya Medical College Kakinada for a period of 2 1/2years from January 2015to June 2017. A total of 344 cases were included in this study. Bone marrow aspiration reports of patients were retrieved from the record file in department. Peripheral blood smear along with necessary hematological and clinical parameters were also noted from record file. Aspirates of inadequate material or dry tap were excluded from the study. Then data was manually collected and subsequently analyzed.

III. Results

Atotalnumber of 344 patients were included in this study aged between 9 days to 75years. 174(50.8%) were males and 170 (49.2%) were females with M:F ratio=1.02:1. Maximum number of patients (20%) of hematological disorder who underwent bone marrow aspiration was in the age group of 0-10years. Table-1 shows age and sex distribution of patients.Blood counts and peripheral blood smear revealed anemia in 118(34.3%) cases. Pancytopenia was seen in 117(34%) cases. Thrombocytopenia was seen in 38(11%)cases. Table -2 shows indications for bone marrow aspiration among patients.Bone marrow examination findings are noted in Table-3.Erythroid hyperplasia was the common finding in our study in these cases there were no other significant findings. Megaloblasticmarrow(figure:4) was seen in 24(6.97%)cases. The differential diagnosis of

megaloblastic anemia was commented in each of these cases as clinical correlation with biochemical and other parameters are required to diagnosis.

In all cases of aplastic anemia the marrow was hypocellular and all three lineages of cells were correlated with peripheral blood smear which also showed pancytopenia.

Acute leukemia was seen in 29(8.2%) cases. Out of this 17 cases were AML, 12 cases were ALL. Total 6 cases were diagnosed as multiple myeloma and biochemical, radiological and clinical correlation was recommended in each case.In our study we were seen 4(1.1%) cases of megakaryocyte hyperplasia. Congenital dyserythropoieticanemia(figure: 3) and Gauchers disease was seen in 2(0.58%) cases each. Transient Myeloproliferative disorderand Aplastic anemia were seen in 1(0.29%) case each.

IV. Discussion

Hematological disorders include a wide range of diseases ranging from reactive hyperplasia to hematological malignancies. Bone Marrow Aspiration plays a very important role not only in determining the cause of disease but also help in establishing a definitive diagnosis. It's a relatively safe procedure which can be performed on an out patient basis. This study was conducted to know the spectrum of hematological disorders in our area and diagnostic value of BMA cytology examination in a tertiary care hospital.In our study the most common age group undergoing BMA was 0-10 years. In a study done by Shastry et al the majority of patients were from the age group of 21 - 30years.[2]In our study the age of the patients ranged from 9days to 75years. Age and sex distribution was compared with other studies as shown in Table-4 which were correlated with other studies. Slight male predominance observed in present study and was correlated with all other studies. The commonest indication of BMA was anemia (34.3%) followed by pancytopenia(34%). Similar to our finding anemia was the commonest indication in astudy done by Ishwarsingh et al[6]and the second common indication in a study done by Manjitkaur et al.[7]In our study thrombocytopenia alone was seen in 11% cases.

Erythroid hyperplasia was seen in 120 (34.8%) cases. Similarly it was the commonest bone marrow finding in a studies done by Pudasaini S et al[8] and Jha et al.[9]

Megaloblastic anemia was the 3rd common diagnosis in the present study. But in contrast it was the 2nd common diagnosis in studies done by Pudasaini S et al[8], Niazi et al[5], Jha et al.[9] Acute leukemia was seen in 29(8.2%) cases. Out of this 12 cases were ALL(figure:1) and 17 cases were AML. Other series alsoshowed that acute leukemia is the commonest hematological malignancy. In our study CML was seen in 4(1.1%) cases. Other malignanciesseen in present study were multiple myeloma 6(1.7%)(figure:2) and MDS 9(2.6%) cases.

ITP was seen in 7.8% cases. Other studies showed 10.5% and 14.5% cases respectively.[8,10]

Hypoplasticmarrow were seen in 6.4% cases. Diagnosis was based on BMA findings. It is recommended that both aspiration and trephine biopsy be done simultaneously in cases of pancytopenia especially if aplastic anemia is suspected though aspiration smears are superior for morphological details. Compared to our study 5.3% and 14% cases of hypoplastic marrow were seen in other studies.[8,11]

Two cases of Gauchers disease were also seen in our study. Bone marrow involvement is common in storage disorders. They can present as hematological abnormalities and BMA helps in confirmation of diagnosis.[12]1 case of aplastic anemia was found in our study. Epidemiologically aplastic anemia has a pattern of geographic variation opposite to that of leukemias with higher frequency in the developing world than in industrialized west.[13]

V. Conclusion

1.Although BMA is an uncomfortable procedure for the patient and should be performed when there is a clear clinical indication.

2. It is a useful technique in the diagnosis and management of a wide range of hematological and some nonhematological diseases especially in aresource- poor centers.

Table 1: Age & Sex Distribution Of Patients

AGE IN YEARS	MALE	FEMALE	TOTAL	%
0-10	39	30	69	20.0
11-20	28	39	67	19.3
21-30	23	36	59	17.2
31-40	23	28	51	14.6
41-50	24	21	45	13.7
51-60	14	13	27	7.7
61-70	19	2	21	6.2
>70	4	1	5	1.3
TOTAL	174	170	344	100

Table 2: Indications For Bone Marrow Aspiration Among Patients

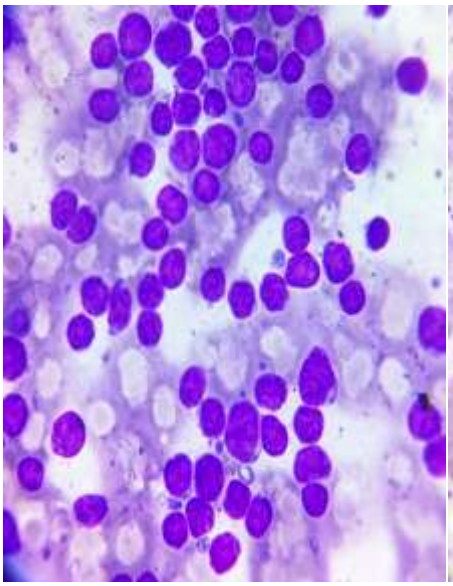
S.No	Indication	No.Of Cases	%
1	Anemia	118	34.4
2	Pancytopenia	117	34
3	Fever	17	4.9
4	Jaundice	04	1.16
5	Bleeding/Thrombocytopenia	38	11
6	Hepatospleenomegaly	44	12.7
7	Lytic Lesion	06	1.74
	Total	344	100

Table 3: Bone Marrow Examination Findings

S.No	Diagnoses	Male	Female	Total	%
1	ErythroidHyperrplasia	57	63	120	34.8
2	Reactive Marrow	42	40	82	23.8
3	Megaloblastic Marrow	13	11	24	6.97
4	ITP	09	18	27	7.8
5	Hypoplastic Marrow	11	11	22	6.4
6	ALL	06	06	12	3.4
7	AML	11	06	17	4.8
8	CML	3	1	04	1.1
9	MDS	7	2	09	2.6
10	Multiple Myeloma	4	2	06	1.7
11	Myelofibrosis	3	0	03	0.87
12	Megakaryocyte Hyperplasia	3	1	04	1.1
13	CDA	0	2	02	0.58
14	Gauchers Disease	1	1	02	0.58
15	Transient Myeloproliferative Disorder	1	0	01	0.29
16	Aplastic Anemia	0	1	01	0.29
17	Normal Marrow	3	5	08	2.32
	Total	174	170	344	100

Table 4: ComparisionOf Age, Sex & Number Of Cases In Different Studies

	STUDY	YEAR	NO.OF CASES	AGE RANGE	SEX RATIO
1	Saeed et al[15]	2010	117	2-76	1.49:1
2	Shastry et al[2]	2012	110	0-90	1.03:1
3	Pudasaini et al[8]	2012	057	9m-75	1:1.1
4	Jha et al[9]	2013	86	2-80	1.26:1
5	Nigam et al[14]	2014	345	2-80	1.28:1
6	Singh et al[6]	2014	674	2-78	1.4:1
7	Present study	2017	344	9days-75	1.02:1



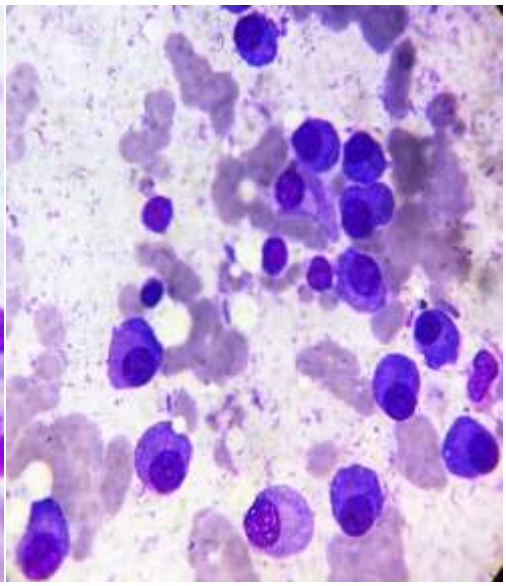
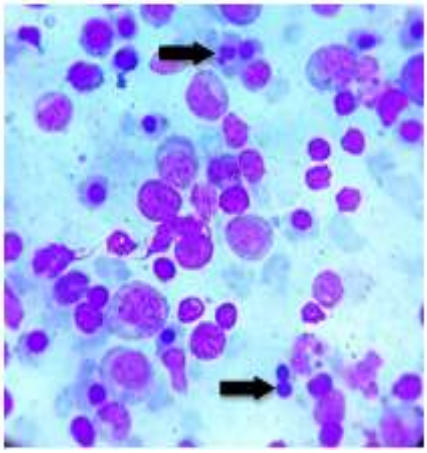


Figure: 1 BMA picture of ALL showing lymphoblasts**Figure: 2** BMA picture of Multiple myeloma showing Plasma cells



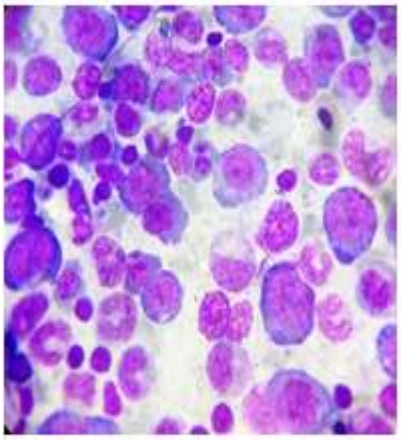


Figure: 3 BMA picture of CDA showing dyserythropoiesis.**Figure: 4**BMA picture of Megaloblastic marrow Showingmegaloblasts.

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