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An Audit of Bone Marrow Aspirations in a Tertiary Care Hospital

Dr. Kruti Bhut[1], Dr. Amit H. Agravat[2], Dr. Gauravi Dhruva[3]

[1]3rd Year Resident, Department of Pathology, P.D.U. Govt Medical College and Hospital, Rajkot, Gujarat, India
[2]Associate Professor, Department of Pathology, P.D.U. Govt Medical College and Hospital, Rajkot, Gujarat, India
[3]Professor and Head, Department of Pathology, P.D.U. Govt Medical College and Hospital, Rajkot, Gujarat, India

Corresponding Author: Dr Amit H Agravat, Associate Professor, P.D.U. Govt Medical College and Hospital, Rajkot, Gujarat, India

Abstract: ***Objective: To study the frequency of hematological and non-hematological disorders found on bone marrow examination in a tertiary care hospital of Rajkot, India. Methodology: Cross sectional descriptive study was conducted at the Pathology Department of P.D.U. Government Hospital, Rajkot from April 2016 to April 2017. A total of 66 patients were included in study. Bone marrow aspiration was done, stained and examined. Results: Out of 66 patients, 4patients(6.0%) had Leukemia, 17(25.7%) had Megaloblastic anemia, Idiopathic Thrombocytopenic Purpura(ITP) was present in 4 patients(6.0%), 10 patients(15.1%) showed normal bone marrow, Aplastic Anemia in 2 patients(3.0%) and 2 patients(3.0%) showed Multiple Myeloma. Conclusion: Anemia was the commonest disorder amongst non-malignant disorders and acute leukemia was the commonest malignant disorder.***

Keywords: Bonemarrow aspiration, Leukemia, Megaloblastic Anemia, Aplastic Anemia

1. Introduction

Examination of the bonemarrow is one of the most valuable diagnostic tool for haematological disorders. It may reveal infections, liketuberculosis, histoplasmosis, leishmaniasis etc. It may be useful in establishing the diagnosis of storage diseases and metastatic non-haemopoietic malignancies or when a leucoerythroblastic peripheral blood picture is present [(1)]. Deviations from the normal may be qualitative with abnormal cellular morphology or quantitative with aplasia, hypoplasia or hyperplasia [(2)].

2. Materials and Methods

All bonemarrow aspirations during the period April 2016 to April 2017 were included in this study conducted in the central clinical laboratory, P.D.U. Government hospital, Rajkot. Patient's history was examined in detail and findings were recorded. Bonemarrow aspiration results were also recorded. Data was analyzed to know the relative frequencies of different haematological disorders.

Bonemarrow aspiration was done under aseptic condition.Slides were stained with Field stain and where needed Leishman's stain was also used.

3. Results

A total of 356 patient's case histories including bonemarrow examination results were analyzed. Ages of the patients ranged between 4 months to 72 years. Males were 35 (53%) and females were 31 (47%).

Bonemarrow examination revealed variety of disorders. The details are given in table 1.

Table 1: Indications for bonemarrow examination

Indication	No. of cases	Percentage
Anemia	21	31.9
Pyrexia of unknown origin	17	25.7
Pancytopenia	26	39.4
Leukemia confirmed	1	1.5
Leucoerythroblastic reaction	1	1.5
Total	**66**	**100**

Table 2: Spectrum of non-malignant haematological conditions

Disease	No. of cases	Percentage
Megaloblastic Anemia	17	34.7
Iron Deficiency Anemia	1	2.0
ITP	4	8.2
Aplastic Anemia	2	4.0
Normal Marrow	10	20.5
Reactive Marrow	15	30.6
Total	49	100

Table 3: Spectrum of malignant haematological conditions

Disease	No. of cases	Percentage
Acute Myeloid Leukemia	3	50
Lymphoproliferarive Disorder	1	16.7
Multiple Myeloma	2	33.3
Total	**6**	**100**

Table 4: Age distribution of bonemarrow aspirate findings

Diagnosis	(0-10) years	(11-20) years	(21-30) years	(31-40) years	(41-50) years	(51-60) years	>60 years	Total
Megaloblastic Anemia	2(11.7%)	5(29.4%)	0	4(23.5%)	2(11.7%)	2(11.7%)	2(11.7%)	17
Iron Deficiency Anemia	0	0	1(100%)	0	0	0	0	1
ITP	3(75%)	1(25%)	0	0	0	0	0	4
Aplastic Anemia	1(50%)	1(50%)	0	0	0	0	0	2
Acute Myeloid Leukemia	0	2(66.7%)	0	0	1(33.3%)	0	0	3
Lymphoproliferative Disorder	0	0	0	0	0	0	1(100%)	1
Multiple Myeloma	0	0	0	0	0	1(50%)	1(50%)	2
Normal Marrow	4(40%)	0	1(10%)	2(20%)	0	1(10%)	2(20%)	10
Reactive Marrow	2(13.3%)	2(13.3%)	2(13.3%)	5(33.3%)	0	1(6.7%)	3(20%)	15
Dry Tap	0	0	0	0	2(66.7%)	0	1(33.3%)	3
Diluted marrow inadequate for evaluation	1(12.5%)	1(12.5%)	2(25%)	0	3(37.5%)	0	1(12.5%)	8
Total	13(19.6%)	12(18.2%)	6(9.1%)	11(16.6%)	8(12.1%)	5(7.6%)	11(16.6%)	66

Table 5: Sex distribution of bonemarrow aspirate findings

Diagnosis	Female cases	Male cases	Total
Megaloblastic Anemia	10(58.8%)	7(41.2%)	17
Iron Deficiency Anemia	0	1(100%)	1
ITP	1(25%)	3(75%)	4
Aplastic Anemia	1(50%)	1(50%)	2
Acute Myeloid Leukemia	1(33.3%)	2(66.7%)	3
Lymphoproliferative Disorder	0	1(100%)	1
Multiple Myeloma	0	2(100%)	2
Normal Marrow	5(50%)	5(50%)	10
Reactive Marrow	7(46.7%)	8(53.3%)	15
Dry Tap	1(33.3%)	2(66.7%)	3
Diluted marrow inadequate for evaluation	5(62.5%)	3(37.5%)	8
Total	**31(47%)**	**35(53%)**	**66**

4. Discussion

This study shows that amongst the micronutrient anaemia, megaloblastic anaemia is the most common non-malignant disorder in our patients. In other similar studies its frequency ranges from as low as 24% to as high as 68% [3, 4]. In almost all these studies pancytopenia was the main presentation and so was the case in our study. Rarely megaloblastic anaemia may present with thrombocytopenia only [5].In a similar study done in Peshawar, megaloblastic anemia was present in 27% of the patients[6].

Amongst other micronutrient anaemia, iron deficiency accounted for 6.5% only. This percentage is much lower than expected as an estimated 60 to 80% of the world's population has this nutritional deficiency [7].

Idiopathic thrombocytopaenia purpura was the third most common non-malignant haematological disorder found on bone marrow examination in our patients. More than 70% of the cases in children end up in remission within six months whether treated or not. ITP is usually chronic in adults [8] and the probability of durable remission is 20-40% [9].

Normal and reactive bone marrows were found in approximately one third of our patients and therefore a confirmatory diagnosis was made in two thirds of the patients. This goes to show that bone marrow examination is a useful test and diagnosis can be made in a majority of patients, where the procedure is indicated.

In about 16.7%, the bone marrow aspirate material was inadequate for evaluation and this could point towards a fibrotic lesion in the bone marrow or inadequate technique.

Table 6: Comparison with other studies

Finding	Current Study (Out of 66 cases)	Niranjan Mainali et al[10] (Out of 88 cases)	Vidhisha Mahajan et al[11] (Out of 460 cases)	N.A. Okinda et al[12] (Out of 356 cases)	Munir AH et al[13] (Out of 157 cases)
Megaloblastic Anemia	17 (25.7%)	12(13.6 %)	153(33.2 %)	29(8.1%)	26(16.5 %)
Multiple Myeloma	2(3.0%)	2(2.2%)	20(4.3%)	20(5.6%)	-
ITP	4(6.0%)	15(17.0 %)	1(0.2%)	15(4.2%)	26(16.5 %)
Normal Marrow	10(15.1 %)	4(4.5%)	100(21.7 %)	74(20.7 %)	18(11.4 %)
Reactive marrow	15(22.7 %)	-	40(8.7%)	51(14.3 %)	-
Dry Tap	3(4.5%)	6(6.8%)	23(5%)	10(2.8%)	-
Micronormoblastic Anemia	-	10(11.3 %)	-	23(6.4%)	9(5.7%)
Hypoplastic Anemia/Aplastic Anemia	3(4.5%)	26(29.5 %)	20(4.34%)	5(1.4%)	9(5.7%)
Leukemia	3(4.5%)	4(4.5%)	30(6.5%)	29(8.1%)	30(19.1 %)
Lymphoproliferative Disorder	1(1.5%)	1(1.1%)	54(11.7%)	24(6.7%)	-
Granulomatous Reaction	-	-	8(1.7%)	-	-
Leishmaniasis	-	3(3.4%)	4(0.8%)	-	2(1.2%)
MDS/MPN	-	3(3.4%)	6(1.3%)	9(2.5%)	-
Metastasis	-	2(2.2%)	1(0.2%)	9(2.5%)	2(1.2%)
HIV Dyspoiesis and other Infections	-	-	-	39(10.9 %)	-
Hemolytic Anemia	-	-	-	4(1.1%)	17(10.8 %)
Mixed Deficiency	-	-	-	1(0.2%)	-
Anemia of Chronic Disease	-	-	-	-	8(5.1%)
Drug Induced Bonemarrow Suppression	-	-	-	4(1.1%)	-
Miscellaneous (Hemoglobinopathies, PNH, Malaria, Myelofibrosis, Hypersplenism)	-	-	-	-	10(6.3%)
Inadequate for	8(12.1%)	-	-	10(2.8%)	-

evaluation					

5. Conclusion

Anemias (especially the due to nutritional deficiency), were the commonest disorder amongst the non-malignant hematological disorders. Acute leukemia was the most common malignant hematological disorders.

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