BONE MARROW ASPIRATION FINDINGS IN A TERTIARY CARE HOSPITAL OF PESHAWAR

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ABSTRACT

Objective: To study the frequency of hematological and non-hematological disorders found on bone marrow examination in a tertiary care hospital of Peshawar.

Methodology: This cross sectional descriptive study was conducted at the pathology department of Khyber Medical College and Khyber Teaching Hospital, Peshawar from Jan to Dec 2013. A total of 157 patients were included in this study. Bone marrow aspiration was done, stained and examined.

Results: Out of 157 patients, 30 patients (19.1%) had leukemia, 26 (16.6%) had megaloblastic anemia, ITP was present in 26 patients (16.6%), 18 patients (11.5%) showed normal bone marrow, 17 patients (10.8%) had evidence of hemolytic anemia, aplastic anemia was present in 9 patients (5.7%), iron deficiency anemia was seen in 9 patients (5.7%), anemia of chronic disorder was present in 08 patients (5.1%), hypersplenism was present in 05 patients (3.2%), metastatic lesions, PNH and visceral leishmaniasis was present in 2 patients (1.3%) each. Malaria, myelofibrosis and evidence of hemoglobinopathies was found in 01 patient(0.6%) each.

Conclusion: Anemia was the commonest disorder amongst non-malignant disorders and leukemia was the commonest malignant disorder.

Key Words: Leukemia, Megaloblastic Anemia, Aplastic Anemia

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INTRODUCTION

Bone marrow aspiration has an important role in diagnosis of diseases of blood cell system. Hematological disorders at first, usually appears as anemia. Bone marrow aspiration plays an important role in diagnosing the underlying cause[1]. It has not only diagnostic but prognostic value as well[2]. Before performing bone marrow aspiration full medical history of the patient, clinical evaluation and thorough study of tests already performed should be made[3]. Bone marrow examination is also useful in diagnosing certain non hematological disorders like storage disease, metastasis lesions, etc[4].

Leukemia, refers to white blood cell malignancies with the exception for erythroleukemia (AML-M6) which arises from precursors of RBCs. Out of 30 patients of leukemia, 28 were suffering from acute forms of leukemia and only 02 were suffering from chronic forms of leukemia. In a study conducted in Institute of Radiotherapy and Nuclear medicine (IRNUM) Peshawar, it was found that 89% of patients had leukemia of acute forms and 9% suffered from chronic leukemia[5].

In megaloblastic anemia, patients has low RBCs count and RBC are larger in size (>100fl). In our set up the most common cause of megaloblastic anemia is nutritional deficiency of Vit B-12 and folate. Patients can present with variety of symptoms, even with psychiatric symptoms[6]. Estimation of serum Vit B-12 and folate should be emphasized in patients who has pyrexia of unknown origin with pancytopenia[7].

Idiopathic thrombocytopenia is due to an autoimmune process caused by auto antibodies binding to the platelet antigen resulting in the destruction of platelets. In such patients the platelet count is persistently low although megakaryocytes in the bone marrow are normal or increased in number[1].

The aim of present study was to determine the frequency of hematological and non-hematological disorders found on bone marrow examination in a tertiary care hospital of Peshawar.

METHODOLOGY

The study was done in Department of Pathology of Khyber Teaching Hospital and Khyber Medical College. Only admitted patients were included in this study. Bone marrow aspiration was performed only on those patients who were advised to do so by their consultants.

Patients were of different age groups, both gender, belonging to different areas of Khyber Pukhtunkhwa. Total duration of study was one year, starting from January 2013 to December 2013.

Bone marrow aspiration was done under aseptic condition .Slides were stained with Leishman's stain and where needed, special stains like Sudan Black and Periodic acid Schiff were used. To evaluate iron stores in bone marrow, Prussion Blue was used.

RESULTS

Total of 157 patients underwent bone marrow aspiration and examination. Minimum age of the patients was 1½ years and maximum age was 60 years. Out of 157 patients, 71 were male and 86 were female.

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

DISCUSSION

In our study 10.88% patients showed signs of hemolytic anemia. Hemolytic anemia occur when there is increased red blood cell destruction and bone marrow fail to form new red blood cells at the same rate. It may be inherited or acquired. To confirm the diagnosis other investigations like G6PD level, osmotic fragility, direct and indirect Coomb's test, etc are done.

In our study megaloblastic anemia was found in 16.6% of patients. In a similar study done in Peshawar, megaloblastic anemia was present in 27% of the patients[8].

In a study conducted in Mangalore, 94.7% cases of ITP showed increased number of megakaryocytes in the bone marrow[9]. In our study ITP was seen in 16.6% of patients. In another study ITP was present in 82 patients[10].

Aplastic anemia which may be congenital or acquired, is the result of failure of normal hemopoietic cells of the bone marrow which results in decreased production of all types of blood cells (RBCs,WBCs platelets). Aplastic anemia is more common in male than the female[11]. In this study the number of affected male was double to that of female. In a study conducted in Karachi, out of 144 patients of aplastic anemia, 108 were male and only 38 were female[12]. Hepatitis which is spreading at an alarming rate in our society, is not an uncommon cause of aplastic anemia[13].

Anemia due to deficient body iron stores is the most commonly diagnosed anemia which affects more than 800 million people worldover[14]. In this study 5.7% patients showed iron deficiency anemia which is much lower than the expected, as 60% of world population is suffering from iron deficiency[15]. In our society the most common cause of iron deficiency anemia is worm infestations and nutritional deficiency. Children and women of child bearing age are the most affected.

Anemia of chronic disorders is the second most common anemia and it is due the disturbance in hemostatic mechanism of body iron .It is mostly present in patients with chronic diseases.Iron is available but its incorporation with globin is defective, thus iron that is entering the body is stored in the reticuloendothelial system[16]. The role of bone marrow aspiration and examination become important to differentiate it from pure iron deficiency anemia in which iron stores of the bone marrow are depleted.

By hypersplenism we mean that the spleen is overactive. This type of spleen removes blood cells (RBCs, WBCs and platelets) at a much faster rate from circulation than their release in circulation and also pooling of blood cells occur in spleen result in bicytopenia and pancytopenia in the peripheral blood smear[17]. Hypersplenism is not a very uncommon phenonmenon in our set up.In this study hypersplenism was present in 3.2% of the patients whereas in a study done in King Fahad Hospital Saudi Arabia, 4.4% of the patients showed hypersplenism[18].

The bone marrow contains stem cells which are the progenitors of all types of blood cells.In patients suffering form myelofibrosis,stem cells produce increased number of megakaryocytes which not only releases platelets but also produce fibroblasts in increased number. These fibrolasts produce increased fibrous tissue in the bone marrow and normal hemopoietic function of the bone marrow is affected resulting in anemia and splenomegaly. In this study myelofibrosis was seen in only 0.6% of the patients whereas in a study conducted in Ghana,it was present in 2.5% of the patients[19].

Bone marrow aspiration can be used as a prognostic tool. In patients with carcinogenesis, spread of tumor cells to the bone marrow can totally change treatment modalities and prognosis of the disease[20]. In this study only 2 patients had metastatic bone marrow lesions.

Paroxysmal nocturnal hemoglobinuria can be confirmed by Ham's test and flow cytometry.Bone marrow aspiration findings can suggest the possibility of PNH[21].

Sensitivity of PCR is much higher than direct bone marrow aspiration in diagnosis of visceral leishmaniasis, at times this is an additional finding[22]. In our study visceral leishmaniasis was seen in two cases. In a similar study done at Lady Reading Hospital, Peshawar, one case of visceral leishmaniasis was seen[23].

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.

Table 1: Disorders shown as bone marrow findings

Bone Marrow Findings	Total Affected Patients	Gender		Total % age	Gender	
		M	F		M	F
Leukaemia	30	13	17	19.1	8.2	10.8
Megaloblastic anemia	26	12	14	16.6	7.6	8.9
Idiopathic thrombocytopenia	26	16	10	16.6	10	6.4
Hemolytic anemia	17	9	8	10.8	5.7	5.1
Normocellular	18	8	10	11.5	5.1	6.4
Aplastic anemia	09	6	3	5.7	5.1	6.4
Iron deficiency anemia	09	2	7	5.7	1.2	4.5
Anemia of chronic disorder	08	3	5	5.1	1.9	3.2
Hypersplenism	05	4	1	3.2	2.5	0.6
Metastatic lesion	02	0	2	1.3	0	1.3
Visceral leishmaniasis	02	0	2	1.36	0	1.3
PNH	02	2	0	1.3	1.3	0
Malaria	01	1	0	0.6	0.6	0
Myelofibrosis	01	0	1	0.6	0	0.6
Hemoglobinopathies	01	1	0	0.6	0.6	0

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CONTRIBUTORS

AHM conceived the idea, planned the study, and drafted the manuscript. SQ helped acquisition of data and did statistical analysis. AG and ZA drafted the manuscript and critically revised the manuscript. All authors contributed signifi-cantly to the submitted manuscript.