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Research Article

**OUTCOME OF BONE MARROW BIOPSIES PERFORMED AT
TERTIARY CARE HOSPITAL IN ISLAMABAD**¹Dr. Amna Bakhtiar, ²Dr. Maria Rehman, ³Dr. Sadaf Zafar¹Demonstrator, Fazaia Medical College, Islamabad²Akhtar Saeed Medical and Dental College Lahore³Avicenna Medical and Dental College Lahore**Abstract:**

Objective: To compare the outcome of bone marrow aspirate with the referral diagnosis and to study the pattern of different hematological abnormalities by bone marrow biopsy

Study Design: Cross sectional descriptive study

Duration: 1st January 2018 to 30th April 2018

SETTING: Department of pathology, Pakistan institute of medical sciences, Islamabad

Materials and Methods: Bone marrow biopsies of 180 patients performed during 4 month's period were assessed. Physician's referral and the final report of the bone marrow biopsy were recorded. Data was analyzed by SPSS-16 and results were drawn accordingly

Results: Infection related changes found in 14% of bone marrow biopsy requests. Leukemia is second most common diagnosis occurring in 10% of biopsies. 10% of bone marrows came out to be reactive. Out of 26 bone marrows for staging or bone marrow infiltration 22 were found to have no infiltration while 4 had infiltration.

Conclusion: Bone marrow biopsy is a very useful diagnostic tool for hematological disorders. Malignant and non malignant conditions were diagnosed adequately. Most common diagnosis in our study came out to be some infection related changes. Leukemia was most commonly found malignant disorder.

Keywords: Bone Marrow biopsy, hematological abnormalities, Leukemia

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INTRODUCTION:

Hematological disorders are very common in our population.^{1,2} They are classified into a wide range of disorders from very simple iron deficiency anemia to infiltrative carcinoma of the bone marrow.³⁻⁶ Bone marrow helps in diagnosing the underlying cause of haematological abnormalities. Bone marrow aspiration is of both diagnostic and prognostic value. Full medical history and examination was undergone before taking bone marrow biopsy. All the available laboratory tests of the patient are also evaluated.⁴ Pancytopenia, Megaloblastic anemia, Aplastic anemia, Idiopathic thrombocytopenia purpura and Hepatosplenomegaly are a few commonly seen conditions in which the bone marrow biopsy is advised by the clinician.¹ Some non hematological disorders like metastatic cancer, storage diseases and bone marrow infiltrator are also diagnosed with the help of bone marrow aspirate and biopsy.⁶

The pattern of hematological disorders is different in the industrialized and developing countries.⁶ The data regarding pattern of hematological disorders in the developed countries is not representative of our population. Therefore, this study was conducted with the aim to analyse the pattern of haematological disorders on bone marrow examination in our setup. This study also helped in comparing referral diagnosis with the results of biopsy.

MATERIALS AND METHODS:

This Descriptive cross-sectional study was performed at the Department of Pathology, Pakistan institute of

Outcome of the results is divided into referral diagnosis and bone marrow diagnosis

PANEL-A	PANEL-B
Referral diagnosis	Final bone marrow diagnosis
Pancytopenia:33	Megaloblastic anemia:12
Malignancy:15	Leukemia:18
Leukemia:16	Lymphoma:4
Bicytopenia:14	ITP:10
Hepatosplenomegally:7	Reactive bone marrow:18
Visceral Leishmaniasis:2	Infection related changes:25
Multiple Myeloma:2	Visceral Leishmaniasis:4
ITP:13	Hypocellular bone marrow:8
Lymphoma:3	Aplastic anemia:4
Aplastic anemia:6	Storage disease:2
Lymphadenopathy:1	HLH:3
Storage disease:4	Hypersplenism:6
Bleeding disorder:2	Multiple myeloma:2
Hemolytic anemia:2	Metastatic cancer:1
Pyrexia of unknown origin:2	Refractory anemia:2
Myelodysplastic syndrome:3	Sideroblastic anemia:1
Severe/refractory anemia:4	Erythroid hyperplasia:3
Thrombocytopenia:3	Iron deficiency anemia:5
Post treatment malignancy:22	In remission:16
	Not in remission:6
Staging malignancy/infiltration:26	Bone marrow infiltration:4
	No infiltration:22

medical sciences, Islamabad, from 1st January 2018 to 30th April 2018. Demographic data including age, sex and indication for bone marrow biopsy of patient was recorded. Bone marrow aspiration was taken under local anesthesia with aseptic technique. Bone marrow sample was obtained from anterior tibial tuberosity in children less than two years' age, and posterior superior iliac spine in patients above two years age. The area was cleaned with alcohol swab, local anesthesia was given. After two minutes, aspiration sample was taken using 16 gauge LP needle.⁷ Trepine biopsy was taken in patients older than 2 years of age.

Slides were stained using Wrights stain. Prussian blue stain was used for iron. Special stains like PAS and Sudan black were used where indicated. Slides were examined under microscope, and findings were recorded. Results were analysed using SPSS version 16. Mean and standard deviation were calculated for quantitative variables e.g. age. Frequencies and percentages were calculated for qualitative variables like diagnosis and gender.

Inclusion criteria

All patients of either gender, for whom bone marrow was advised by the consulting physician were included in this study.

RESULTS:

DISCUSSION:

In this study 6.7% of the patients were found to have megaloblastic anemia. In a similar study in tertiary care hospital in Peshawar megaloblastic anemia was diagnosed in 16% of the patients.⁸ This high rate of megaloblastic anemia is due to many causes. Micronutrient deficiency of vitamin b12 and folate is the most common cause of this type of anemia

ITP is the decrease in platelet count with due to unknown causes. In ITP there are increased megakaryocytes seen in bone marrow.⁹ In our study 10 out of 13(80%) patients suspected of ITP had increased megakaryocytes and were diagnosed hereafter as Idiopathic thrombocytopenic purpura. Similar findings were seen in a research conducted at China, 96% cases were diagnosed as ITP showing typical features.¹⁰

Overwhelming infection was found to be the most common result of bone marrow biopsy (14%). A systemic infection or sepsis causes irritation of the bone marrow and depression of cell lineages. This leads to pancytopenia or bicytopenia. Serial monitoring of blood counts and treatment of underlying infection is most important treatment in such cases. An outcome of reactive bone marrow was seen in 10% of the assessed bone marrows.

Aplastic is caused by failure of the bone marrow cells in producing progenitor cells. This results in pancytopenia. Aplastic anemia is commonly found in developing countries compared with the industrialized countries.¹¹ In our study aplastic anemia was found in 2.4% of the population with equal gender ratio. In a similar study, out of 88 patients of aplastic anemia, 60 were male and only 28 were female.¹² Hepatitis is a very common cause of aplastic anemia in our population.¹³

Diagnosed patients of malignancy were referred for bone marrow infiltration and staging. 4 out of 26 had infiltration of the bone marrow. 22 patients had bone marrow biopsy after one cycle of treatment. 6 out of these 22 patients were not in remission. 16 patients responded to treatment and were in remission.

Iron deficiency anemia affects 800 million people worldwide.^{14, 15} In this study 3% patients had iron deficiency anemia. These findings are much lower than expected. In a study conducted in Bangladesh 53% of population is suffering from iron deficiency.¹⁶ Worm infestation and nutritional deficiency are the most common causes of iron deficiency in our population. Women of child bearing

age and pediatric group are the most vulnerable groups for iron deficiency.

Hypersplenism is the overactivity of the spleen. Such type of spleen removes all the blood cells lines from circulation at a very fast rate than their release. Pooling of blood cells also occur in spleen. Blood counts show pancytopenia and bicytopenia.¹⁷ In our study 3.3% of the patients had hypersplenism whereas in a Chinese study, hypersplenism was seen in 4.4% of the patients.¹⁸

In patients with carcinoma, infiltration of tumor cells in the bone marrow should be assessed. In such cases bone marrow biopsy is a diagnostic and prognostic tool.¹⁹ In this study 4 patients had metastatic bone marrow infiltration. 3 of these cases were infiltrations by lymphoma and one was some metastatic tumor of unknown origin.

Multiple myeloma is a plasma cell tumor seen in middle aged population. It shows an increase in plasma cells diffusely and also focally inside tissues.²⁰ Tumor infiltration to the bone marrow is considered positive when plasma cells rise more than 10 percent of the total cell count. In this study 3 patients had multiple myeloma.

Leishmaniasis is an epidemic in certain areas of Pakistan especially areas of Kashmir district. Heatosplenomegally is almost always seen, Fever and pancytopenia are other seen complaints.²¹ In this study visceral leishmaniasis is found in four cases. Similar studies show increased incidences of visceral Leishmaniasis in endemic areas.²² It is a preventable and treatable disease if care is taken and prompt diagnosis done.

CONCLUSION:

Infection related changes were the commonest nonmalignant hematological disorders (14%) in our setup. Acute lymphoblastic leukemia was found to be the most common malignant disorder, followed by Acute Myeloid Leukemia. Prompt diagnosis and treatment are valuable in such diseases. Preventive measures should be taken in cases of epidemics causing hematological abnormalities. The study has also demonstrated that bone marrow biopsy examination is a reliable procedure to diagnose different hematological diseases in cases where routine investigations fail to make conclusive diagnosis.

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