



Significance of Bone Marrow Aspiration in Hematological Disorders

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Abstract

Aims and Objective: Hematological disorders are quite frequent in all age group. Most of this hematological disorder first present as anemia. Bone Marrow Aspiration plays a major role in the diagnosis of its underlying cause. The aim of this study was to analyze the spectrum of hematological disorders.

Materials and Methods: This was carried out prospective study of Bone marrow examination of 130 cases in suspected case of hematological disorders. All details of the patients were obtained from the record file in the department of pathology of our hospital.

Results: Among the malignant hematological disorders, Acute Myeloid Leukemia (AML) was the most common disorders 12(9.23%) followed by CML 8 (6.15%), CLL 5 (3.85), ALL 3(2.31) and MDS 2(2.31%). Among the non-malignant hematological disorders, Megaloblastic anemia 35(26.92%), Iron deficiency Anemia 17(13.08%), Dimorphic Anemia 28(21.54%), Bone marrow Hypoplasia 8(6.15%) and ITP 3(2.31%).

Conclusion: Bone marrow examination is an important step to arrive at the confirmatory diagnosis of many hematological disorders.

Keywords: Bone marrow examination, Non- malignant hematological disorder and Malignant hematological disorder.

Introduction

Hematological disorders are quite frequent in all age groups. Most of these hematological disorders are first present as a anemia. Most of the time the diagnosis can be arrived at by detail clinical examination and few simple investigations. However in some cases without bone marrow examination diagnosis is usually not a confirmatory.

Biopsy of bone marrow is an indispensable adjunct to the study of diseases of the blood &

may be the only way in which a correct diagnosis can be made¹.The spectrum of hematological disorders is relatively different in the developing world than the developed countries². Most of the time the diagnosis can be arrived at by detail clinical examination and few simple investigations. However without bone marrow examination the diagnosis is usually not a confirmatory. Bone marrow examination is one of the most frequent and relatively very safe invasive procedures done routinely in the hospitals.

Though an invasive procedure, it can be easily performed even in the presence of severe thrombocytopenia with little or no risk of bleeding. Commonly it is done for the evaluation of unexplained cytopenias and malignant conditions like leukemias. Bone marrow examination is also at times done for the diagnosis or staging of a neoplasm and storage disorders. At time it is also done in cases of lymphomas, granulomatous conditions and osteoporosis. So there are wide variety of disorders where bone marrow examination provides diagnostically important information, which otherwise would not be possible. This study was undertaken with the view to study the etiological spectrum of disorders as diagnosed on bone marrow examination.

Materials and Methods

This prospective study was carried out among 130 patients with suspected hematological disorders, in department of Pathology, Nalanda Medical College & Hospital, during period of May 2016 to October 2018. Both adult and child patients referred for bone marrow study were included. The study was approved by institutional ethical research review board.

Procedure: Bone Marrow was collected by bone marrow aspiration needle from posterior iliac spine, sternum and tibia in case of infant , each selected patient after giving local anaesthesia by 2% Lidocaine hydrochloride .

Bone marrow aspiration was carried out in these entire patient and Smears obtained were stained with Romanowasky stains and examined under light microscope. Cytochemical stains like Periodic acid schiff and Sudan black stains were used when needed.

Results

In the present study out of total 130 cases, 99 (76.15%) were found non malignant hematological disorders and 31(23.85%) were malignant hematological disorders. Amongst non malignant disorders, incidence of Megaloblastic anemia was highest in 35(26.92%) cases. Other non-malignant hematological disorders noted were Iron deficiency anemia, Dimorphic Anemia, Idiopathic thrombocytopenic purpura(ITP). Amongst 31(23.85%) patients of malignant bone marrow disorders most of the patients were of leukemia and 1(0.77%) patients were of metastasis to bone marrow. In cases of leukemia, Acute myeloid leukemia is most common noted in 12(9.23%) cases. Other primary malignant disorders noted were of, chronic lymphocytic leukemia (CLL), Chronic myeloid leukemia (CML), Acute myeloid leukemia(AML) and Acute lymphoblastic leukemia(ALL). In cases of metastasis to bone marrow of 1(0.77%) were metastasis from Adenocarcinoma of lungs.

Bone marrow examination findings of study population (n=130):-

Hematological disorders		NO. OF CASES	%
Non Malignant Conditions	Megaloblastic Anemia	35	26.92
	Iron Defeciency Anemia	17	13.08
	Dimorphic Anemia	28	21.54
	Bone Marrow Hypoplasia	8	6.15
	ITP	3	2.31
	Poor Aspiration	5	3.85
	Normal Study	3	2.31
Malignant Conditions	AML	12	9.23
	CML	8	6.15
	CLL	5	3.85
	ALL	3	2.31
	MDS	2	1.54
	Metastasis from Adenocarcinoma of Lungs	1	0.77
TOTAL		130	100.

Discussion

Bone marrow evaluation is a very important aid in diagnosis and management of hematological disorders. Bone marrow examination is safe and a useful test in reaching the final diagnosis⁶. The spectrum of hematological disorders both in children and in adult is very wide. It is one of the most common and safe procedures in medical practice. Rarely infection, excessive bleeding or embolism has been reported after bone marrow biopsy³. In our study, out of 130 study population, maximum 12 (9.23%) were Acute Myeloid Leukemia (AML), which was commonest malignancy in our patients. In contrast to the present study, in a study in Pakistan among children, Rahim et al, reported only 6.36% were Acute Myeloid Leukemia (AML) and maximum 17.92% were Acute Lymphoblastic Leukemia (ALL), which was only 3 (2.31%) in the present study⁴. The incidence of ALL in our study is lower as compared to India and China⁷. Other malignancies in this study were CML 8(6.15%), and Myelodysplastic Syndrome (MDS) 2(1.54%).

In this study out of 130 cases, non malignant hematological disorder of bone marrow study, Megaloblastic anemia 35(26.92%) were most common and Dimorphic Anemia (both iron and folic acid deficiency anemia) were 28 (21.54%). Similarly 24.29% micronutrients deficiency anemia like megaloblastic anemia and 15% mixed deficiency anemia was reported by Rahim et al, in a study in Pakistan⁴. The third most common non-malignant disorder is Bone marrow Hypoplasia in our patients 8(6.15%). In a study in Pakistan, Rahim et al, reported 14.15%, which was similar to the present study⁴. Idiopathic thrombocytopenic purpura was the fifth most common hematological disorder 3 (2.31%) found on bone marrow examination in our patients. It is the most common cause of mucocutaneous bleeding. Its frequency on bone marrow examination varies between 32% to 48%⁸. Rahim et al, reported 14.15% aplastic anemia cases in a study in

Pakistan among children, which was contrary to the present study⁸.

Conclusion

The results for Bone marrow examination in this study are slightly very to those reported in other studies. For the study of various hematological disorders, Bone marrow evaluation is a very important aid in diagnosis and management of hematological disorders. This study also focussed the need to rule out the underlying cause in cases of unexplained anemia, Cytopenias and suspected case of Leukemia/Lymphoma. Bone marrow aspiration turns out to be a very simple and safe investigation, which could be repeated if needed and can even be carried out in outpatient. Technically it is simple procedure if carried out by an experienced person.

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