ORIGINAL RESEARCH PAPER

Volume-7 | Issue-9 | September-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

INTERPRETATION OF BONE MARROW ASPIRATION IN HAEMATOLOGICAL DISORDERS

Pathology

Dr. Dantkale Sunita S. Asso. Professor Dr. V.M. Government Medical College, Solapur.

Dr. Shete Smita S.* Assist. Professor Dr. V.M. Government Medical College, Solapur. *Corresponding Author

Dr. Pandit G. A. Professor & HOD Dr. V.M. Government Medical College, Solapur.

Dr. Gulshan Ansari Junior Resident Dr. V.M. Government Medical College, Solapur.

ABSTRACT

BACKGROUND- This was a two years retrospective study of bone marrow aspiration done on patients in a tertiary care centre. 105 patients were analysed considering the detailed clinical examination and investigations in the period from 2016 to 2018. The significance of bone marrow examination in establishing the primary diagnosis was determined. The age of patients ranged from 5 years to 83 years with a male preponderance.

OBJECTIVES- To evaluate the frequency of involvement of bone marrow in haematological disorders.

RESULTS- Among the non malignant haematological disorders, megaloblastic anaemia was the most common disorder (30.5 %) followed by combined deficiency anaemia (22.8 %) and iron deficiency anaemia (18 %). Acute lymphoid leukemia was the commonest malignant haematological disorder.

CONCLUSION- Bone marrow aspiration is an important procedure for confirmatory diagnosis in many malignant and non malignant disorders. It helps in planning further investigations and management.

KEYWORDS

Bone marrow aspiration, megaloblastic anaemia, iron deficiency anaemia, acute lymphoid leukemia.

INTRODUCTION- Anaemia is common worldwide disease, most commonly noted in developing countries[1]. The spectrum of haematological disorder is different in developing countries than the developed countries. Detailed clinical history and bone marrow examination are helpful for confirmatory diagnosis. Bone marrow examination also gives confirmatory diagnosis in cytopenias and leukemia[2].

Bone marrow aspiration is the most frequent and safe invasive procedure. There is very little or no risk of bleeding and can be safely done in case of severe thrombocytopenia.

MATERIAL & METHODS- This was retrospective and prospective study done in department of pathology for a period of two years. A total of 105 cases were included in the study. Peripheral blood smear were examined. Details of clinical history were obtained from the record files. Special cytochemical stains like periodic acid Schiff (PAS) and myeloperoxidase stain were done and examined wherever necessary.

RESULTS-

TABLE 1: Shows age wise distribution

Sr.	Age group(years)	No. of cases	Percentage (%)
1	0-10	16	15.2
2	11-20	34	32.3
3	21-30	23	21.9
4	31-40	9	8.5
5	41-50	6	5.7
6	51-60	9	8.5
7	61-70	5	4.7
8	71-80	1	0.9
9	>81	2	1.9
	Total	105	100

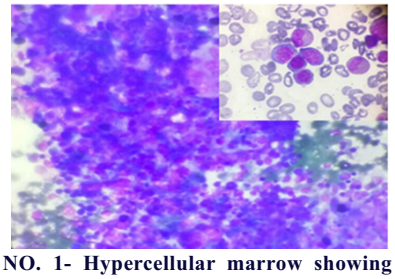

FIGURE NO. 1- Hypercellular marrow showing erythroid hyperplasia (10x4). Inset shows megaloblasts (oil emulsion).

Table no. 2: Shows Signs & Symptoms

Sr.	Signs & Symptoms	No. of cases	Percentage(%)
1	Fatigue, weakness, pallor	88	83
2	Fever	75	71.4
3	Hepatomegaly	35	33.3
4	Splenomegaly	40	38
5	Lymphadenopathy	6	5.7
6	Bony pain, tenderness, pathological fracture	2	1.9
7	Petechiae	1	0.9
8	Gum bleeding	1	0.9
9	Epistaxis	1	0.9

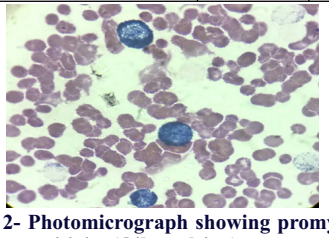

FIGURE NO. 2- Photomicrograph showing promyelocytes with myeloperoxidase positivity (Oil emulsion).

Table no. 3: Shows Bone marrow aspiration findings in 105 cases

Sr	Bone marrow findings	No. of cases	Percentage(%)
1	Aplastic anaemia	1	0.9
2	Megaloblastic anaemia	32	30.5
3	Combined deficiency anaemia	24	22.8
4	Iron deficiency anaemia	19	18
5	Dimorphic anaemia	2	1.9
6	Idiopathic thrombocytopenic purpura	1	0.9
7	Acute lymphoblatic leukemia	6	5.7
8	Acute myeloid leukemia	4	3.8
9	Chronic myeloid leukemia	2	1.9
10	Plasma cell dyscrasia	2	1.9
11	Chronic lymphoblastic leukemia	1	0.9
12	CLL/PLL	1	0.9
13	Lymphoma	1	0.9
14	No specific abnormality	9	8.6
	Total	105	100

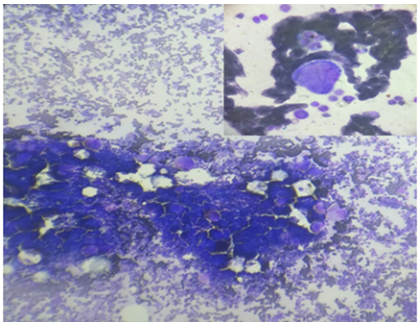

FIGURE NO. 3- Photomicrograph showing megakaryocytic hyperplasia(4x10). inset shows megakaryocytes having unilobated nuclei and hypogranularity(Oil emulsion)

RESULTS- In the present study we analysed 105 smears of bone marrow aspiration along with peripheral smear. Table no. 1 shows age distribution. Male preponderance (57 cases, 54.3%) was observed while 48 cases were female (45.7%). Fatigue, weakness and pallor were observed in maximum number of cases (83%) followed by fever 71% (Table no. 2). Table no. 3 shows bone marrow aspiration findings. In the study nutritional anaemia contributed highest number of cases (73.3%), out of which megaloblastic anaemia was the most common disorder (30.5%) followed by combined deficiency anaemia (22.4%) i.e. megaloblastic and micronormoblastic anaemia. Amongst the haematological disorders acute lymphoblastic leukemia was noted in 5.7% of cases followed by acute myeloid leukemia (3.8%)

Macrocytic anaemia was noted predominantly in male patients. Most of the patients gave history of chronic alcoholism. Hypersegmented neutrophils were characteristically present on peripheral smears. Bone marrow aspiration revealed erythroid hyperplasia with megaloblastic erythropoiesis. Giant myelocytes and band forms were noted (Figure no. 1).

Female patients in age range of 11 to 60 years presented with fatigue, weakness and pallor. Peripheral smear showed microcytic hypochromic anaemia (18%). Bone marrow aspiration findings were erythroid hyperplasia with micronormoblastic erythropoiesis.

In all six cases of ALL, patients presented with generalised lymphadenopathy. Peripheral smear findings revealed presence of blasts more than 90 %, having inconspicuous nucleoli which showed Periodic acid Schiff (PAS) positivity.

A 55 years female was admitted for procidentia. On general examination patient had generalised lymphadenopathy. Routine peripheral smear study showed lymphocytosis. On bone marrow aspiration diagnosis of CLL/PLL was given. Aspirate smear revealed predominance of small lymphocytes (75%) and prolymphocytes (20%).

In four patients of AML, hepatosplenomegaly was noted in two cases and two patients presented with gum bleeding and petechiae. In all patients, fever was predominant symptom. On peripheral smear blasts (more than 20%) having large nucleus and 2-3 nucleoli were seen. Auer rods were present in two cases.

A 45 years male patient was presented with pancytopenia on peripheral smear. Bone marrow study showed predominance of promyelocyte having large azurophilic granules and Auer rods forming Faggotts. Myeloperoxidase stain was strongly positive(Figure) and diagnosed as acute promyelocytic leukemia(M3). (Figure no. 2)

70 years male patient admitted for anaemia, bone marrow aspiration finding showed plasma cell less than 10%. Serum electrophoresis was done which revealed presence of M protein . In the second case, 46 years male presented with repeated infection and bone pain, bone marrow aspiration revealed plasmacytosis more than 10 %. The mature plasma cell showed abundant deeply basophilic cytoplasm with perinuclear clear halo area and eccentric nucleus. The immature plasma cells had large nucleus with finely dispersed nuclear chromatin and one to two prominent nucleoli with light blue cytoplasm. Binucleated and multinucleated cells were also seen.

35 years female patient presented with petechiae, peripheral smear study showed thrombocytopenia and microcytic hypochromic anaemia. Bone marrow was hypercellular with megakaryocytic hyperplasia. Many megakaryocytes were small with unilobated nuclei and lack of granules. In these patients secondary causes of thrombocytopenia were excluded and diagnosed as idiopathic thrombocytopenic purpura(Figure no. 3)

DISCUSSION- The bone marrow is one of the body's largest organ. The bone marrow can be sampled relatively easily using a needle aspiration. The spectrum of haematological disorders both in children and adults is very wide. Bone marrow examination is a useful test to arrive at a final diagnosis. Hematologic diseases primarily affecting the bone marrow causing an increase or decrease in any of the cellular blood elements are among the most common indications for bone marrow study. Large yield of bone marrow fragments can obtained if aspiration is done from posterior iliac crest in children. Adequate cellularity can also be obtained via sternal approach in adults.

In the present study males were affected more than the females. Similar findings have been reported by Rahim et al[3], Arjun et al [4], Rajesh et al[5].

Age wise distribution revealed highest number of cases in younger age group. Similar observations were made by Rajesh et al[5] Shastry et al[6].

The most common clinical presentation in the present study was pallor, fatigue and weakness (83%) which was commonly observed in non neoplastic causes and similar findings were noted by Tripathy et al[7]. The second most common complaint was fever (71.4%). Similar clinical observation was made by Goyal et al[8] and James et al[9] in their study. Hepatomegaly (33.3%) and splenomegaly(38%) were also common findings.

The commonest indication of bone marrow aspiration was pancytopenia followed by bicytopenia. These findings are in concordance with study done by Ahmed et al[10]. Megaloblstic anaemia was the most commonest cause of pancytopenia.

Megaloblastic anaemia was the commonest disorder in the present study (30.5%) followed by combined deficiency anaemia i.e. micronormoblastic and megaloblastic (22.8%) & micronormoblastic anemia (18%). Similar findings were noted by Rahim et al[8]. We could not identify the exact deficiency leading to megaloblastic anaemia as serum folic acid or Vitamin B12 levels were not assessed.

Folate deficiency is more common in children while B12 deficiency is more common in adults[11]. It is a common problem in developing countries. The usual presenting age in developed world is infancy while in developing countries like India, it can occur at any age.

Cases of iron deficiency anemia were less than (18%) than megaloblastic anemia. The reason may be that most patients with iron deficiency anaemia are treated on out patient basis and bone marrow examination is not routinely done to confirm the diagnosis. Micronormoblastic anemia is common in females and it can be attributed to low socioeconomic status, menstrual disorders and pregnancy.

In our study leukemia was common malignant haematological disorder. Majority were of acute variety (9.5%) while 3.8% cases were of chronic leukemia. Similar observation were made by Anjum et al [4].

The commonest haematological malignancy noted was ALL (5.7%) in the present study. Our findings were in concordance with Rahim et al[3].

Bone marrow aspiration alone is usually sufficient to diagnose nutritional anemias, most of the acute leukemias and immune thrombocytopenias.[12]

In nine cases (8.6%), no specific findings were noted. In these patients normocytic normochromic anemia was present and they needed further investigations like electrophoresis. Due to low socioeconomic status they could not afford investigations.

CONCLUSION- Examination of bone marrow is one of the most important pillar in diagnosis of haematological and various systemic illnesses including pyrexia of unknown origin. This study is helpful in understanding disease progression and in planning further investigations and management.

REFERENCES-

1. Interpretation of one marrow aspiration in haematological disorders. Journal of Pathology Nepal 2012; Vol 2: 309-312. Pudasaini S, Prasad KBR Runiyar SK etal.
2. Kibria SG, Islam MDU, Chowdhury ASNJ etal. Prevalence of haematological disorders: A Bone marrow study of 177 cases in a private hospital at Faridpur, Med College. J 2010,5:11-3.
3. Rahim F, Ahmad I, Islam S, etal. Spectrum of haematological disorders in children observed in 424 consecutive bone marrow aspiration. Pak J Med Sci 2005;21:433-36.
4. Anjum MU, Shah SH, Khaliq M A. Spectrum of haematological disorders on bone marrow aspirate examination. Gomal J Med Sci 2014;12:193-196.
5. Rajesh Gautam, Arshad Ikram, Dwijendra Nath etal 2016; national Journal of Medical and Allied science Vol-5, issue 2: 109-111.
6. Shastry SM, kolte SS. Spectrum of haematological disorders observed in one hundred and ten consecutive bone marrow study in kohat. PJMHS. 2014; 8(3):531-32.
7. Tripathy S, Dudani S. comparative evaluation of simultaneous bone marrow aspiration & trephine biopsy- Experience from routine clinical practice Ind J clinic practice. 2013;5:446-950.
8. Goyal S Singh UR, Rusia U. Comparative Evaluation of Bone Marrow Aspirate with Trephine Biopsy in Hematological Disorders & Determination of optimum Tephine Length in Lymphoma infiltration. Mediterr J hematol Infect Dis 2014;1:12.
9. James LP, Stass SA, Schumacher HR. Value of imprint preparations of bone marrow biopsies in hematologic diagnosis. Cancer.1980;173-177.
10. Ahmad SQ, Khan OU, Zafar N. Utility of bone marrow Examination in a Secondary Care hospital JRMC 2011;15:40-1.
11. NgSC, Kuperan P, Chan GL. Megaloblastic anemia_a review from University Hospital, kuala Lampur Ann Arcad Med Singh. 1988;17:61.
12. Bhagya Lakshmi Atla, Venkatalakhmi Anem, Anuradha Dasari. Prospective study of bone marrow in haematological disorders. International Journal of Research in Medical Sciences, August 2015, Vol 3, Issue 8.