IJPRP

Indian Journal of Pathology: Research and Practice
Volume 7 Number 9, September 2018
DOI: http://dx.doi.org/10.21088/ijprp.2278.148X.7918.7

Original Research Article

Spectrum of Various Causes of Pancytopenia in a Tertiary Care Hospital

Javed Iqbal[1], Megha Agrawal[2], Nausheen Khan[3], Sidhartha Shankar Sinha[4]

[1-3]Assistant Professor [4]Associate Professor, Department of Pathology, Integral Institute of Medical Sciences & Research, Lucknow, Uttar Pradesh 226026, India.

Corresponding Author:
Megha Agrawal, Assistant Professor, Department of Pathology, Integral Institute of Medical Sciences & Research, Lucknow, Uttar Pradesh 226026, India.

E-mail: drmeghagarg07@gmail.com

Received on 09.08.2018,

Accepted on 31.08.2018

Abstract

Objective: Bone marrow examination performed in cases of pancytopenia detected on peripheral blood smears to find out cause of it. *Place & duration:* The study was carried out at Integral Institute of Medical Sciences & Research, Lucknow from Jan 2017-June 2018. *Material & Methods:* We report 43 cases of pancytopenia.Bone marrow aspiration was done by 16 gauze salah needle and obtained smears then stained with leishman and MGG stain. *Results:* Out of 43 cases, 28 were males and 15 were females. 29 smears shows of hypercellular marrow, hypocellular smears in 8 cases & 6 cases were of normocellular marrow. *Conclusion:* This study conclude that the megaloblastic anemia was the common etiology. Other causes are acute leukemias, nutritional anemia with dual deficiency & multiple myeloma.

Keywords: Pancytopenia; Megaloblastic Anemia.

Introduction

Pancytopenia is a common clinical manifestation seen routinely in pateints attending the medicine OPD. It is defined as the reduction in all 3 formed elements of blood RBCs, WBCs, & platelet below the normal range. We selected patients of >14 yrs of age having the following hematological parameters:- Hb<10gm/dl, TLC <4000/cumm, Plt <1,00,000/cumm, without any previous history of hematological malignancy. Sometimes pancytopenia is detected as an incidental feature in a patient who presented with symptoms of a disorder that is capable of depressing the level of all cellular elements in the blood [1]. Hemogram & bone marrow examination necessitate critical evaluation of hematological disorder to reach a definitive diagnosis. Causes of pancytopenia vary worldwide among different geographical locations and ethnic groups [2,3].

Material and Methods

This study was conducted in the department of pathology IIMS & R. Patients admitted in our hospital through OPD or emergency during 1.5 yr of period from Jan 2017 to June 2018. Detail history, clinical findings and investigations were noted. Bone marrow aspiration was performed by using salah needle either from iliac crest or sternum. Bone marrow smears are then stained with leishman and MGG stain. On the basis of the cellularity of the bone marrow fragments smears were categorized as hypercellular, normocellular and hypocellular smear.

Observations

Out of 43 cases, 28 were males and 15 were females; age ranges from 15 to 80 years; maximum cases belongs to the age 15 to 25 yrs (Table 1). Pallor was present in all cases. Most common symptom was weakness followed by fever, splenomegaly and bleeding. (Table 2).

Mild to moderate anisopoikilocytosis was seen commonly in most of the peripheral blood smear. Megaloblastic anemia was the most common cause of pancytopenia. Peripheral smears reveals macrocytes, macro ovalocytes along with hypersegmented polymorphs. Dimorphic blood picture exhibit macrocytes and microcytic hypochromic cells. Normocytic normochromic picture seen in cases of acute leukemia as well as aplastic anemia. Moderate degree of anisopoikilocytosis seen in acute leukemia while less marked in aplastic anemia. Rouleaux formation was noted in cases of multiple myeloma.

In the present study, 29 cases with hypercellular marrow were identified. Out of which megaloblastic anemia was the most common etiology found in 12 cases. The marrow is dominated by erythroid hyperplasia with significant left shifting includes characteristic megaloblastic erythroid precursors and giant metamyelocytes in granulocyte series. Megakaryocytes are smaller, slightly increased in numbers & have hyperlobated nuclei. These changes are typically caused by vitamin B12 or folate deficiency, although a number of drugs affecting DNA synthesis have also been implicated [4].

4 cases of combined deficiency nutritional anemia were noted with features of both megaloblastic anemia and iron deficiency anemia. In about 7 cases of acute leukemia, hypercellular marrow shows heavy infiltration by leukemic blasts. Normal hematopoietic cells were markedly reduced in number but were morphologically normal. In 5 cases of hypercellular marrow, M: E ratio was reversed because of erythroid hyperplasia due to hypersplenism. One cause of hypercellular marrow is multiple myeloma. (Table 3).

Total 8 cases of hypocellular marrow were identified. 7 cases showed hypoplastic marrow with adequate number of fragments, decreased cellularity varying from moderate reduction to complete absence and increased fat to cell ratio, suggestive of aplastic anemia. One case of acute leukemia with hypocellular marrow was documented. (Table 4).

Out of 6 cases of normocellular marrow 3 cases showed normal study, 2 cases of nutritional anemia with combined deficiency and 1 case of multiple myeloma. (Table 5).

Table 1: Age wise distribution

Age range	Cases
15-25	19(44.18%)
26-35	08(18.60%)
36-45	03(6.97%)
46-55	06(13.95%)
56-65	05(11.62%)
66-75	01(2.32%)
76-85	01(2.32%)

Table 2: Clinical features

Symptoms/Signs	Frequency in %
Pallor	100%
Generalized weakness	57.66%
Fever	39.30%
Splenomegaly	38.13%
Mucosal Bleeding	21.20%
Hepatomegaly	12.68%
Gastrointestinal symptoms	09%

Table 3: Hypercellular Bone marrow

Disease	Cases
Megaloblastic anemia	12(27.9%)
Acute leukemia	7(16.27%)
Erythroid hyperplasia	5(11.62%)
Combined deficiency nutritional anemia	4(9.30%)
Multiple myeloma	1(2.32%)

Table 4: Hypocellular Bone marrow

Disease	Cases
Hypoplastic anemia	07(16.27%)
Acute leukemia	1(2.32%)

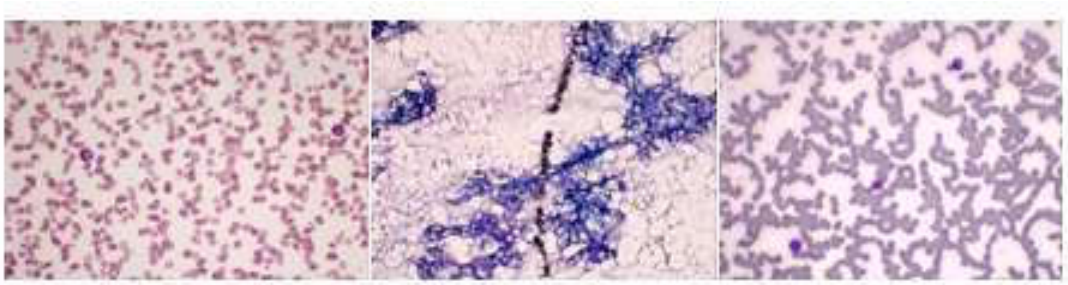
Table 5: Normocellular Bone marrow

Disease	Cases
Normal study	3(6.97%)
Combined deficiency nutritional anemia	2(4.65%)
Multiple myeloma	1(2.32%)

List of Abbreviations

Hb	Haemoglobin
TLC	Total Leukocyte Count
OPD	Out Patient Department
M: F ratio	Male to Feamle Ratio
MGG	May-Grunwald's Stain

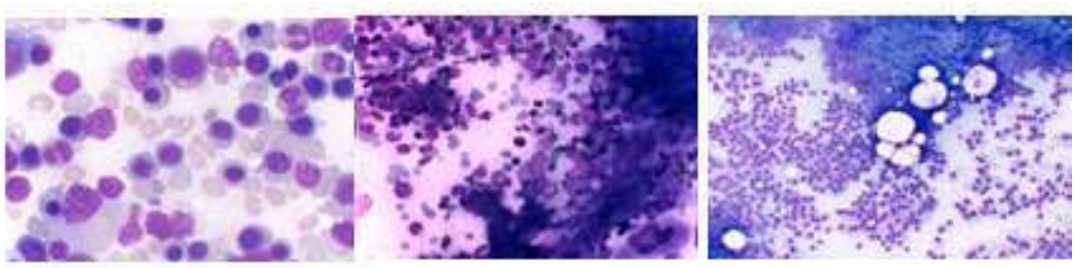
Hypercellular bone marrow | Hypocellular bone marrow | Normocellular bone marrow



PBS of Megaloblasticanaemia-hypersegmentedneutrophils,macro-ovalocytes, tear drop cells.

Bone marrow aspirate of aplastic anaemia shows hypocellular fragments with increased fat spaces

Peripheral smear of Multiple Myeloma shows rouleaux formation.



Bone marrow aspirate smear of Megaloblastic Anemia shows megaloblastic erythropoiesis seive like chromatin.

Bone marrow aspirate of AML

Bone marrow aspirate of Multiple Myeloma shows plasma cells & few abnormal multinucleate forms.

Discussion

Pancytopenia is the depression of all the three cell lines and is not an uncommon finding we come across in haematology department.

It has number of causes and is broadly classified as: decreased bone marrow function or increased peripheral destruction. In some patients the marrow may be normally cellular or even hypercellular and no abnormal cell may be present as is seen in many patients of this study.

In this study pancytopenia was observed in the age group of 15 to 85 years and maximum affection in the age group of 15 to 25 years (44.18%) with M: F ratio 1.37:1. Kalpana et al reported pancytopenia in the age group of 15-80 years with mean age of 35.7 year and M: F ratio 1.37:1 [5]. B N Gayathri et al. observed pancytopenia in the age group of 2-80 years with mean age of 41 year and M:F ratio 1.2:1 [3]. Jha A. et al. observed pancytopenia in the age group of 1-79 years with a mean age of 30 years and M: F ratio 1.50:1.[6] Kishor Khodke et al. observed age range of 3-69 years with M: F ratio 1.3:1. Maximum numbers of cases were found in the age group of 12-30 years (44%) [7].

Pallor was the most common sign and was present in 100% cases. The commonest symptoms were generalized weakness and fever in 57.66% and 39.30% cases respectively. Bleeding manifestation was present in 21.20% cases. Kalpana et al observed pallor was the commonest sign in 100% of cases followed by weakness 57.66% & fever in 39.33%.[5]B N Gayathri et al. observed fever and generalized weakness as common symptoms and pallor as the commonest sign [3]. Rangaswamy M et al. observed generalized weakness and fatigue (88%) as the commonest presenting complaints [8].

In present study, hypercellular marrow was present in 67.44% patients followed by hypocellular in 18.60% and normocellular in 13.95% cases. Kalpana et al reported 68.87% of hypercellular marrow, 16.86% of hypocellular marrow and 14.45% of normocellular marrow [5]. Rangaswamy M et al. observed hypercellular bone marrow in 75%, hypocellular in 14% and normocellular in 11% of the patients [8].

Nutritional deficiency was the common contributing factor of pancytopenia in 41.86% patients. Megaloblastic anemia was the most common cause constituting 27.90%. Neoplastic etiology contributed in 20.93% patients, commonest cause was acute leukemia. Kalpana et al. found nutritional deficiency in 36.14% of cases, mostly because of megaloblastic anemia i.e. 25.3% of cases. Acute leulemia was the most common cause amongst the 22.89% of neoplastic etiology [5]. B N Gayathri et al. observed megaloblastic anemia (74.04%) as a commonest cause followed by aplastic anemia in 18.26% [3]. Kishor Khodke et al. observed megaloblastic anemia in 44% cases followed by aplastic anemia in 14% and kala azar in 14% [7]. Megaloblastic anaemia has shown the highest percentage (40.4%) among all the causes, as all other developing countries of Asia [7] and Africa [9].

Acute leukemia is the second most common cause of pancytopenia. Frequency of acute leukemia matches the results of study carried out at Jamshuru, Sindh [10]. Acute leukemia constituted 18.59% including 16.27% with hypercellular marrow and 2.32% with hypocellular marrow. These findings are similar to Kalpana et al. as 15.67% of acute leukemia includes 14.45% of hypercellular marrow and 1.2% of hypocellular marrow [5].

In current study hypoplastic marrow was found in 16.27%. The reported incidence of aplastic anemia varies considerably between countries e.g. from 0.7 to 4.1 per million per year in one study. Possibly the best approach is to consider it a clinicopathological correlation of profound cellular hypoplasia combined with pancytopenia [4]. Incidence is lower in Europe and North America than in various other parts of the world e.g. Asia [11].

Conclusion

Pancytopenia is not an uncommon hematological finding encountered in clinical practice commonly presenting as pallor, generalized weakness, fever and mucosal bleeding. The study focused on reversible treatable etiologies such as nutritional deficiencies i.e. megaloblastic anaemia presenting with pancytopenia as they look ominous but respond rapidly to effective therapy can be quickly diagnose by bone marrow study along with basic hematological investigations and clinical details.

References

1. Frank Firkin, Colin Chesterman, David Penington, Bryan Rush. De Gruchy's Clinical Haematology in Medical Practice. Fifth edition. Delhi Oxford University Press. pp.119-36.
2. Pathak R, Jha A, Sayami G. Evaluation of bone marrow in patients with pancytopenia. JPN. 2012;2: 265-71.
3. Gayathri BN, Rao KS. Pancytopenia: A clinico hematological study. J Lab Phys. 2011;3(1):15-20.
4. Anaemias and aplasias; Kelvin Gatter and David Brown, Bone marrow diagnosis: an illustrated guide, third edition. p.32.
5. Kalpana et al, Morphological spectrum of bone marrow in pancytopenia- A retrospective study in a tertiary care centre. Journal of evolution of medical and dental sciences; 2014;3(4):1056-1064.
6. jha A,Sayami G,Adhikari RC, Panta AD,jha R. Bone marrow examination in cases of pancytopenia. J Nepal Med Assoc 2008;47(169):12-7
7. khodke K, Marwah S, Buxi G, Yadav RB, Chaturvedi NK. Bone marrow examination in cases of pancytopenia. J Indian Acad Clin Med 2001;2:55-9
8. Rangaswamy M, Prabhu, Nandni NM, Manjunath GV. Bone marrow examination in pancytopenia. J Indian Med Assoc. 2012 Aug;110(8):560-2, 566.
9. Savage DG, Allen RH, Gangaidzo IT, Levy LM, Gwanzura C, Moyo A, et al. Pancytopenia in Zimbabwe. Am J Med Sci. 1999;317(1):22-32.
10. Memon S, Shaikh S, Akbar M, Nizamani A. Etiological spectrum of pancytopenia based on bone marrow examination in children: J Coll Physicians Surg P. 2008;18(3):163-7.
11. Barbara J. Bain, David M. Clark and Bridget S. Wilkins. Bone Marrow Pathology, 4th Edition. Wiley-Blackwell. Ajohn Willy and Sons, Lt, Publications.