International Journal of Advances in Medicine
Khan SP et al. Int J Adv Med. 2018 Aug;5(4):946-949
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933
DOI: http://dx.doi.org/10.18203/2349-3933.ijam20183125

Original Research Article

Evaluation of pancytopenia on bone marrow aspiration- study at a tertiary care center in Kashmir valley, India

Subuh Parvez Khan[1]*, Sajad Geelani[2], Fiza Parvez Khan[3], Noorjahan Ali[1], Shazieya Akhter[1], Sumayya Shah[1], Nusrat Bashir[4], Javid Rasool[2]

[1]Department of Haematopathology, [2]Department of Clinical Haematology, Sher-e-Kashmir Institute of Medical Sciences, Srinagar, Jammu and Kashmir India
[3]Department of Haematology and Transfusion Medicine, [4]Department of Pathology, Government Medical College, Srinagar, Jammu and Kashmir India

Received: 25 April 2018
Accepted: 28 May 2018

***Correspondence:**
Dr. Subuh Parvez Khan,
E-mail: khansubuh@gmail.com

ABSTRACT

Background: Pancytopenia refers to combination of anaemia, leukopenia and thrombocytopenia. It may be a manifestation of a wide variety of disorders, which primarily or secondarily affect the bone marrow. However, aetiology of pancytopenia varies from one geographical region to another. Bone marrow aspiration plays an important role in identifying the cause of pancytopenia. This study was carried to identify the causes of pancytopenia and to find out the bone marrow morphology in cases of pancytopenia.
Methods: This study was conducted in the department of haematology in a tertiary care center in Kashmir valley for a period of 3 years. Inclusion criteria: cases with hemoglobin less than 10 gm/dl, total leucocyte count of less than 4000/mm^3 and platelet count less than 100,000/mm^3 were included in the study.
Exclusion criteria: Patients receiving chemotherapy/radiotherapy were excluded from the study. Bone marrow aspiration (BMA) was performed from posterior iliac crest of the patients. Bone marrow aspiration smears were stained with Leishman stain for microscopy.
Results: A total of 334 cases were studied during a period of 3 years. Age of patients ranged from 1 year to 85 years with mean of 43.59 years.180 cases were male, and 154 cases were female with male:female ratio of 1.2 :1. The commonest cause of pancytopenia was megaloblastic anemia seen in 103 cases (30.8%) followed by dual deficiency anemia seen in 69 cases (20.7%).37 cases (11%) were of acute leukaemia. Aplastic anemia was seen in 35 cases(10.5%). Other causes of pancytopenia were myelodysplastic syndrome, multiple myeloma, iron deficiency anemia and hypersplenism.
Conclusions: Bone marrow aspiration in patients of pancytopenia helps in the identification of the underlying cause in most of the cases. BMA is helpful for understanding the disease process; and in planning further investigations and management of cytopenia patients.

Keywords: Bone marrow aspiration, Megaloblastic, Pancytopenia

INTRODUCTION

Pancytopenia refers to combination of anaemia, leukopenia and thrombocytopenia.[1] It may be a manifestation of a wide variety of disorders, which primarily or secondarily affect the bone marrow.[2] It could be associated with decrease in hematopoietic cell production either due to destruction of marrow tissue by toxins or replacement by malignant or abnormal cells or suppression of normal growth and differentiation. Other

mechanism including ineffective haematopoiesis with cell death in the marrow, formation of defective cells which are rapidly removed from circulation, sequestration and/or destruction of cells by the action of antibodies or, trapping of normal cells in a hypertrophied and over-reactive reticuloendothelial system.[3] Marrow cellularity depends on the cause of pancytopenia. Marrow is hypocellular in cases of primary production failure a or hypercellular as in cases of peripheral destruction of haematopoetic elements, ineffective erythropoiesis or infiltrative disorders of bone marrow. However, aetiology of pancytopenia varies from one geographical region to another. Common aetiologias in developing countries like India being megaloblastic anaemia, infection, drugs, hypersplenism and aplastic anaemia. The severity of pancytopenia and the underlying pathology determine the management and prognosis of the patients.[4] This study was carried to identify the causes of pancytopenia and to find out the bone marrow morphology in cases of pancytopenia.

METHODS

This study was conducted in the department of haematology in a tertiary care center in Kashmir valley for a period of 3 years from January 2015 to December 2017.

Inclusion criteria

- Cases of pancytopenia with hemoglobin less than 10 gm/dl
- Total leucocyte count of less than 4000/mm^3 and platelet count less than 100,000/mm^3.

Exclusion criteria

- Patients receiving chemotherapy/radiotherapy were excluded from the study.

Written informed consent of all study subjects was obtained before undergoing the procedure. BMA was done from posterior superior iliac spine in all the patients with salah needle. the aspirate was drawn with a 20-ml plastic syringe. Bone marrow smears were prepared immediately following aspiration. After being air dried these smears where stained with Leishmann stain for morphological examination. Periodic Acid Schiff (PAS) stain, Sudan Black B(SBB) and Myeloperoxidase (MPO) stain was done wherever required. Statistical analysis was done using SPSS 16.0 software.

RESULTS

A total of 334 cases were studied during a period of 3 years. Age of patients ranged from 1 year to 85 years with mean of 43.59 years.180 cases were male, and 154 cases were female with male:female ratio of 1.2 :1. The commonest cause of pancytopenia was megaloblastic anemia seen in 103 cases (30.8%) followed by dual deficiency anemia seen in 69 cases (20.7%). 37 cases (11%) were of acute leukaemia. Aplastic anemia was seen in 35 cases (10.5%). Other causes of pancytopenia were myelodysplastic syndrome, multiple myeloma, iron deficiency anemia and hypersplenism. Bone marrow aspiration findings are shown in Table 1.

Table 1: Bone marrow aspiration findings in cases of pancytopenia.

Bone marrow findings	No. of cases	Percent
Acute leukaemia	37	1
Aplastic anemia	35	10.5
Dual deficiency anemia	69	20.7
Gauchers disease	01	0.3
Hyperspleenism	06	1.8
Iron deficiency anemia	07	2.1
Leishmaniasis	02	0.6
Malaria	01	0.3
Myelodysplastic syndrome	15	4.5
Megaloblastic anemia	103	30.8
Multiple myeloma	17	5.1
Normoblastic erythroid hyperplasia	29	8.7
Non Hodgkins lymphoma	07	2.1
Secondaries	05	1.5

DISCUSSION

In the present study 334 cases were included. Age of the cases ranged from 1 to 85 years with mean of 43.59 years. Male:female ratio was 1.2:1. Khunger et al carried a study on 200 cases in which the age ranged from 2-70 years with male:female ratio of 1.2:1.[5]

In a study by Tilak et al range of age was 5-70 with male female ratio of 1.14:1.[4] Similar findings were seen in some other similar studies.[6]

The incidence of megaloblastic anemia varies from 0.8% to 32.26% of all panctytopenic patients.[3,6-8] In the present study, megaloblastic anemia is the commonest cause of megaloblastic anemia accounting for 30.8%. Megaloblastic anemia was characterized by erythroid hyperplasia with erythroblasts showing seive like chromatin (Figure 1). In a similar study done by Tilak et al megaloblastic anemia was the commonest cause of pancytopenia constituting 68%.[4] Megaloblastic anemia was commonest cause of pancytopenia in a study conducted by Khodke et al accounting for 44%.[7] In a study by Gayathri et al megaloblastic anemia was seen in 74.04%.[8] Similar results were seen by some other studies of Khunger et al, Manzoor et al, Dahake et al and Rangaswamy et al.[5,9-11] In the present study, dual deficiency anemia was seen in 20.7%. In a study conducted by Kulkarni et al, dimorphic anaemia was the

commonest cause of pancytopenia seen in 36.23% of cases.[12]

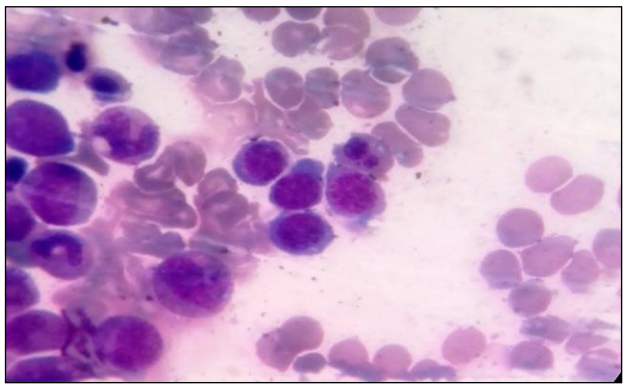

Figure 1: Photomicrograph of Bone marrow aspiration smear of megaloblastic anemia showing erythroblasts with sieve like chromatin. (Leishman stain, 100X).

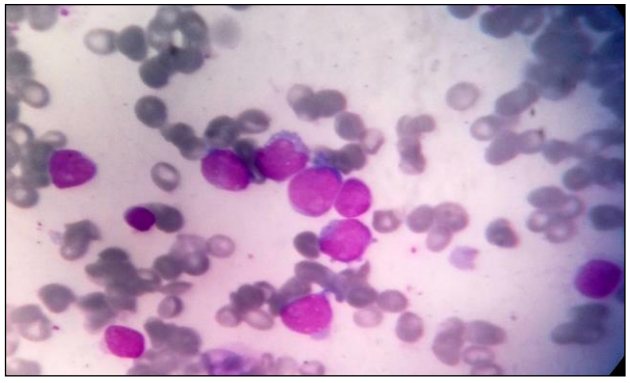

Figure 2: Photomicrograph of Bone marrow aspiration smear of acute leukaemia showing blasts with increased N:C ratio, nuclei having fine chromatin with prominent nucleoli (Leishman stain, 100X).

The incidence of acute leukemia varies between 1.61% - 14.5 % in different Indian studies.13,14 In the present study,11% of cases were of acute leukaemia (Figure 2). In a study conducted by Mir et al acute leukaemia was the second commonest etiology present in 6.78% of total patients.[15] Acute leukemia constituted 8.8% of total cases of pancytopenia in a study conducted by Pathak et al.[16] Acute leukemia constituted third most common cause of pancytopenia in the study of Savage et al and similar finding was seen in study of Varma et al.[17,18] In the study of Aziz et al acute leukemia constituted almost 10% of cases of pancytopenia and was third most common cause of pancytopenia.[19]

In a study by Kumar et al aplastic anaemia was the commonest cause of pancytopenia seen in (29%) of cases.[20] Similarly in a study conducted by Dasgupta et al aplastic anemia constituted 33.5% of cases.[13] However, in present study, Aplastic anemia was seen in 10.5% of cases. It was characterized by increased fat with diminished haematopoetic elements (Figure 3). Present study results are comparable to studies by Khodke et al, khungar et al and Manzoor et al where aplastic anemia constituted 14% of total cases.[5,7,9]

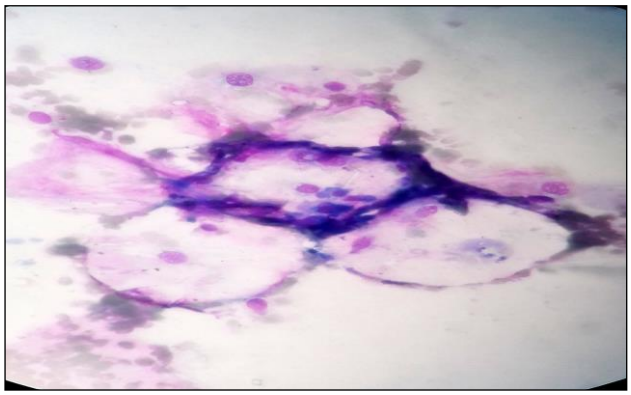

Figure 3: Photomicrograph of Bone marrow aspiration smear of aplastic anemia showing mainly fat cells with decreased haematopoetic elements (Leishman stain, 100X).

In this study one case of Gaucher disease was diagnosed. Gaucher disease was seen in 0.7% of cases of patients with pancytopenia in the study of Ikram et al.[22]

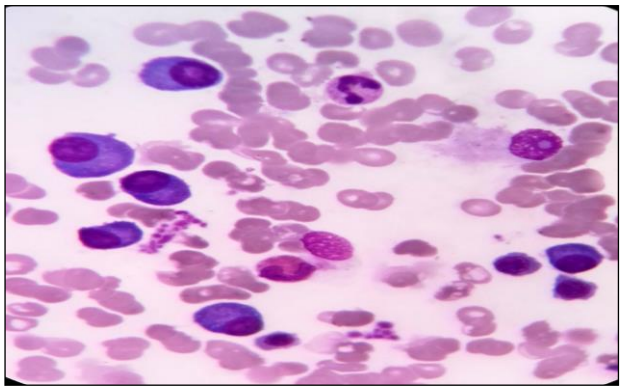

Figure 3: Photomicrograph of Bone marrow aspiration smear of multiple myeloma showing plasma cells with an eccentric nucleus, perinuclear hoff and basophilic cytoplasm (Leishman stain, 100X).

In present study 8.7% of cases showed normoblastic erythroid hyperplasia. This is very low as compared to study by Pathak et al where they found 20% of BMA showed erythroid hyperplasia.[16] Khodke et al found Normoblastic erythroid hyperplasia with peripheral pancytopenia in 14% of cases.[7]

Dasgupta et al, reported an incidence of 2.42% of myelodyspastic syndrome, while present study had 4.5% incidence of myelodysplatic syndrome.[13] Mir et al in their study had mds with an incidence of 3.03%.[15]

In present study, multiple myeloma was seen in 5% cases. More than10% plasma cells were seen on BMA in these cases (Figure 4). This is comparable to studies by Mir et al and Khodke et al, with multiple myeloma constituting 5.30% and 4% of cases respectively.[15,7] In present study Non-Hodgkin lymphoma infiltration was seen in 2.1% cases, this is comparable with Mir et al (3.78% of total patients).[15] mostly non-Hodgkin's lymphoma has incidence varying between 0.9% to 10% in different studies.[21]

CONCLUSION

Bone marrow aspiration in patients of pancytopenia helps in the identification of the underlying cause in most of the cases. BMA is helpful for understanding the disease process; to rule out the causes of cytopenia; and in planning further investigations and management of cytopenia patients. Common causes of pancytopenia in our study are megaloblastic anemias, dual deficiency anemia, acute leukaemia and aplastic anemia.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Watson, Henry G. Blood disease. Davidson's principles and practice of medicine. Amsterdam: Elsevier Health Sci. 2013;989-1056.
2. Guinan EC, Shimamura A. Wintrobe's Clinical Hematology. In: Greer JP, Foerster J, Lukens JN, Rodgers Paraskevas GM, Glader FB, editors. Acquired and inherited aplastic anemia syndromes. 11th ed. Philadelphia: Lippincott Williams and Wilkins; 2004.1397-419.
3. Williams MD. Pancytopenia, aplastic anemia and pure red cell aplasia. In: Lee RG, Foerster J. Lukens J, Paraskevas F, Greer JP, Rodgers GM, (eds). Wintrobe Clinical Haematology. 10th edition, Williams and Wilkins. 1997;1449-76.
4. Tilak V, Jain R. Pancytopenia-a clinico-hematologic analysis of 77 cases. Indian J Pathol Microbiol. 1999;42(4):399-404.
5. Khunger JM, Arulselvi S, Sharma U, Ranga S, Talib VH. Pancytopenia-a clinico haematological study of 200 cases. Indian J Pathol Microbiol. 2002;45(3):375-9.
6. Nanwani P, Khatri S. Pancytopenia - Diagnosis on Bone Marrow Aspiration. Indian J Basic Applied Med Res; 2016;5(2):723-32.
7. Khodke K, Marwah S, Buxi G, Yadav RB, Chaturvedi NK. Bone marrow examination in cases of pancytopenia. J Indian Acad Clin Med. 2001. 2001;2:1-2.
8. Gayathri BN, Rao KS. Pancytopenia: a clinico hematological study. J Lab Physicians. 2011;3(1):15-20.
9. Manzoor F, Karandikar MN, Nimbargi RC. Pancytopenia: A clinico-hematological study. Med J Dr. DY Patil Vidyapeeth. 2014;7(1):25.
10. Dahake V, Margam S, Gadgil N, Patil M, Kalgutkar A. Clinico-haematological analysis of pancytopenia in tertiary care hospital. Int J Sci Stud. 2014;2(8):59-63.
11. Rangaswamy M, Nandini NM, Manjunath GV. Bone marrow examination in pancytopenia. J Indian Med Asso. 2012;110(8):560-2.
12. Kulkarni Naveen S, Patil Appu S, Karchi SD. Study of Pancytopenia in a Tertiary Care Hospital in North Karnataka. Health Sci. 2017;6(3):61-7.
13. Dasgupta S, Mandal PK, Chakrabarti S. Etiology of Pancytopenia: An observation from a referral medical institution of Eastern Region of India. J Lab Physicians. 2015;7(2):90-5.
14. Kale P, Shah M, Sharma YB, Pathare AV, Tilve GH. Pancytopenia with cellular marrow-a clinical study. J Assoc Physicians India. 1991;39:826.
15. Mir TA, Bhat MH, Raina AA. Etiological profile of pancytopenia in a tertiary care hospital of Kashmir valley. Tuberculosis. 2015;4:3-03.
16. Pathak R, Jha A, Sayami G. Evaluation of bone marrow in patients with pancytopenia. J Patho Nepal. 2012;2:265-71.
17. Mudenge B, Savage DG, Allen RH, Gangaidzo IT, Levy LM, Gwanzura C, et al. Pancytopenia in Zimbabwe. Am J Med Sci. 1999;317(1):22-32.
18. Varma N, Dash S. A reappraisal of underlying pathology in adult patients presenting with pancytopenia. Trop Geographical Med. 1992;44(4):322-7.
19. Aziz T, Ali L, Ansari T, Liaquat HB, Shah S, Ara J. Pancytopenia: megaloblastic anemia is still the commonest cause. Pak J Med Sci. 20101;26(1):132-6.
20. Kumar R, Kalra SP, Kumar H, Anand AC, Madan H. Pancytopenia - a six year study. The Journal of the Association of Physicians of India. 2001;49:1078-81.
21. Jain A, Naniwadekar M. An etiological reappraisal of pancytopenia-largest series reported to date from a single tertiary care teaching hospital. BMC Blood Dis. 2013;13(1):10.
22. Ikram N, Hassan K, Bukhari K. Spectrum of hematological lesions amongst children, as observed in 963 consecutive bone marrow biopsies. J Pak Inst Med Sci. 2002;13:686-90.

Cite this article as: Khan SP, Geelani S, Khan FP, Ali N, Akhter S, Shah S, et al. Evaluation of pancytopenia on bone marrow aspiration- study at a tertiary care center in Kashmir valley, India. Int J Adv Med 2018;5:946-9.