

Study on Diagnostic Evaluation of Pancytopenic Patients

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Abstract

Introduction: Pancytopenia is a common hematological problem with an extensive differential diagnosis and is a challenging problem to the treating physician. Bone marrow aspiration and biopsy is an important diagnostic test for patient management. The objective of this study is to find out the incidence various causes of pancytopenia in patients attending to the Enam medical college hospital in savar. **Materials and Methods:** This prospective observational study was done in the department of haematology, Enam Medical College Hospital (EMCH) from July 2012 to June 2019. **Results:** In our study out of 66 patients, 36 (54.55%) were male, 30 (45.45%) were female and male to female ratio were 1.2:1. Generalized weakness 47 (71.21%) and fever 23 (34.85%) were the most common presenting symptoms followed by bleeding 17 (25.76%), weight loss 6 (12.12%), bodyache 6 (9.09%). Most common clinical findings were anemia 57 (86.36%) and bone tenderness 22 (33.33%). Other physical findings were purpura/bruising 13 (19.70%), splenomegaly 10 (15.15%), lymphadenopathy 4 (6.06%) and hepatomegaly 3 (4.55%). Hematological malignancy 29 (43.94%) and hypoplastic marrow 26 (39.39%) were the most common bone marrow finding of pancytopenic patients followed by megaloblastic anaemia 4 (6.06%), leishmaniasis 5 (7.58), and erythroid hyperplasia 2 (3.03%). Acute myeloid leukaemia was the common haematological malignancy 16 (24.24%), others were acute lymphoblastic leukaemia 5 (7.58%). Myelodysplastic syndrome 3 (4.55%), multiple myeloma 4 (6.06%), chronic myelogenous leukaemia in blastic crisis 1 (1.52%). **Conclusion:** So we concluded that complete workup is essential for all cases of pancytopenia to find out the treatable cases and to reduce the mortality and morbidity in serious diseases.

Key words: Pancytopenia, Bone marrow examination, Haematological malignancy.

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Introduction:

Pancytopenia is a common hematological problem with an extensive differential diagnosis and is a challenging problem to the treating physician. It is not a disease but a triad of anaemia, leucopenia and thrombocytopenia. Various pathophysiological mechanisms are related to the development of pancytopenia and this includes reduced or ineffective hematopoiesis and increased destruction by either sequestration or destruction by antibodies¹. The cause of pancytopenia may be thus lie in the bone marrow, periphery or both. Various factors encompassing geographic distribution and genetic disturbances may cause variation in the incidence of disorders causing pancytopenia^{2,3,4}. The presenting symptoms are often attributed to anaemia/thrombocytopenia. Leukopenia is an uncommon cause of initial presentation but can become the most serious threat to life during the course of the disorder⁵. A detailed history, physical examination and complete blood counts with reticulocyte count and peripheral blood smear remain essential for diagnosis. Bone marrow examination is essential to determine the cause of pancytopenia, as it plays a major role in hematological malignancies, unexplained cytopenias and storage disorders⁶. Trephine biopsy is mainly undertaken when hypoplasia or aplasia of bone marrow being suspected on aspiration⁷. The severity of pancytopenia and the underlying pathology determine the management and prognosis of these patients⁸. The objective of this study is to find out the incidence various causes of pancytopenia in patients attending to Enam medical college hospital in savar.

Materials and Methods:

This prospective observational study was done in the department of haematology, Enam Medical College Hospital (EMCH) from July

2012 to June 2019. A total of 66 pancytopenic patient were included in this study. Chemotherapy, radiotherapy and drug induced pancytopenia cases were excluded. Pancytopenia was confirmed by complete blood count and peripheral smear examination. Clinical parameters were assessed, and other necessary haematological investigations were done. Bone marrow aspiration was done thereafter. When aspirated material was inadequate or there was dry tap, trephine biopsy was done. Data was collected and subsequently analyzed.

Results:

Total 66 patients were included in our study. 36 (54.55%) were male, 30 (45.45%) were female and male to female ratio were 1.2:1. The age range of the patients were 9 years to 80 years. Generalized weakness 47 (71.21%) and fever 23 (34.85%) were the most common presenting symptoms. Other presenting symptoms were bleeding 17 (25.76%), weight loss 6 (12.12%), Bodyache 6 (9.09%). Most common clinical findings were anemia 57 (86.36%) and bone tenderness 22 (33.33%). Other findings were purpura/bruising 13 (19.70%), splenomegaly 10 (15.15%), lymphadenopathy 4 (6.06%) and hepatomegaly 3 (4.55%).

Haematological malignancy 29 (43.94%) and hypoplastic marrow 26 (39.39%) were the most common bone marrow finding of pancytopenic patients. Bone marrow finding are given in table I.

Table-I: Bone marrow aspiration finding in case of pancytopenia :

Bone marrow finding	No.of cases	Percentage(%)
Haematological malignancy	29	43.94
Hypoplastic bone marrow	26	39.39
Leishmaniasis	5	7.58
Megaloblastic anemia	4	6.06
Erythroid hyperplasia	2	3.03

Most common haematological malignancy was acute myeloid leukaemia 16 (55.17%). Haematological malignancies are summarizing in table II.

Table-II: Haematological malignancies:

Haematological malignancies	No of cases (n-29)	Percentage (%)	Total number of cases (n-66)	Percentage (%)
Acute myeloid leukaemia	16/29	55.17	16/66	24.24%
Acute lymphoblastic leukaemia	5/29	17.24	5/66	7.58%
Multiple myeloma	4/29	13.79	4/66	6.06%
Myelodysplastic syndrome	3/29	10.34	3/66	4.55%
Chronic myelogenous leukaemia in blastic crisis	1/29	3.45	1/66	1.52%

Discussion:

Pancytopenia is quite common in our day today clinical practice and challenging problem to both physicians and haematologists. Patients commonly presents with features of varying degrees of anaemia followed by infections and bleeding manifestations. A wide variety of disorder can causes pancytopenia demanding thorough evaluation. Diagnostic tools of pancytopenic patients are peripheral blood smear examination, bone marrow aspirations and trephine biopsy.

Total 66 patients with pancytopenia were included in our study with male preponderance, 36 (54.55%) patients were male, 30 (45.45%) were female and male: female ratio was 1.2:1. This is in agreement with Parmar JK et al.(1.6: 1), Nigam RK et al. (1.12: 1), Thakkar BB et al. (1.08:1), Para R & Para S. (1.1: 1), Goyal H et al, (1.37:1) studies^{9,10,11,12,13}. The exact cause of male preponderance is unknown, but may be partly explained by increased exposure of male to environmental agents like agricultural pesticide. Few studies showed female preponderance^{14,15}. Age range was 9 years to 80 years in our study. Same age group also seen by Tilak V and Jain R⁸, Tariq M et al.,¹⁶ Mussarrat N et al.,¹⁷ Qamar U and Aijaz J.¹⁸ Khodke K et al.,¹⁹ and Gayathri BN and Rao KS.²⁰ of their studies.

Generalized weakness 47(71.21%) and fever 23(34.85%) were the most common presenting symptoms. Other presenting symptoms were bleeding 17 (25.76%), weight loss 6 (12.12%), body ache 6(9.09%). Generalized weakness and fever also a most common presenting symptoms were seen in Niazi M and Raziq F.²¹ Pathak R et al.²² Kumar DB, Raghupathi AR¹⁴. Most common clinical findings were pallor 57(86.36%) and bone tenderness 22(33.33%). Pallor was the common clinical sign seen by Parmar JK et al (100%), Thakkar B B et al. (100%), Goyal H et al. (97.8%), Chhabra A et al.(64.8%)^{9,11, 13,23}. The 2nd most common clinical finding was bony tenderness (33.33%) which was near similar to Hayat AS et al. study (44.70%)²⁴ but lower than Anita PJ et al. study(4.71%)²⁵. Other findings in our study were purpura/bruising 13(19.70%), splenomegaly 10(15.15%), lymphadenopathy 4(6.06%) and hepatomegaly 3(4.55%). Common Physical findings included hepatomegaly (24.52%), Splenomegaly (17.92%) and lymphadenopathy (5.66%) in Anita PJ et al. study²⁵, and hepatomegaly (24.32%), splenomegaly (44.14%) and lymphadenopathy (6.31%) in Santra G et al. study²⁶. The frequencies of other clinical features were variable and different from these studies probably due to broad spectrum of etiologies behind pancytopenia.

Hematological malignancy 29 (43.94%) was the most common bone marrow finding of pancytopenic patients in our study which was similar to Imbert M et al.²⁹ study. The commonest cause of pancytopenia was aplastic anemia reported by Mussarrat N et al. (38.3%)¹⁷,Qamar U and Aijaz J. (50.67%)¹⁸, Khodke K et al. (29.5%)¹⁹, Lakhey A et al (29.6%)²⁷, Hossain MA et al.²⁸, whereas in our study it is second common cause accounting for 39.39% (n-26).

The commonest cause of pancytopenia was megaloblastic anaemia reported by Rahim F et al.(24.92%)⁷, Javalgi AP and Dombale VD.(72.6%)³⁰, Rangaswamy M et al.(49%)³¹, whereas in our study it was 6.06% (n-4). We avoided bone marrow examination in suspected cases of megaloblastic anaemia because it is not an essential test for diagnosis.

In our study leishmaniasis seen in 7.58% (n-5) and erythroid hyperplasia seen in 3.03% (n-2) cases. Leishmaniasis 2.1%, 6.9%, 0.6% was seen in Goyal H et al.¹³, Mallik M et al.³², Ojah S et al.³³ study. Erythroid hyperplasia 11.11%, 3%, 11.3% was seen in, Lakhey A et al.²⁷, Sakunthala and Subitha S.³⁴ Makheja KD et al.³⁵ study.

In our study, 43.94% (n-29) of patients presented with haematological malignancy with pancytopenia and was the most common cause of pancytopenia. In present study acute myeloid leukaemia was 24.24% (n-16) of our total cases whereas Jha A et al.³⁶ found acute myeloid leukaemia to be 19.59% of total cases. Lakhey a et al.²⁷ found 12.96% of total cases in their study. Savage DG et al.³⁷ in Zimbabwe and Varma N et al.³⁸ also described acute myeloid leukaemia as the third most common cause of pancytopenia.

In this study acute lymphoblastic leukaemia comprised of 7.58% (n-5) of our pancytopenic patients. In other studies showed 3.70% and 10% of their total cases^{27,39}.

Pancytopenia with multiple myeloma as diagnosis was noted in 6.06% (n-4) of our total patient compared to Khodke K et al. where it was reported to be 4%.

Out of 66 cases the incidence of myelodysplastic syndrome in our study constituted 4.55% (n-4). Qamar U and Aijaz J.¹⁸ reported 5.3% which is comparable to our study. Other study were showed 8.3%, 2.4%, 7.4%^{14,17,27}.

We observed that causes of pancytopenia were variable and different from study to study. This is due to the differences in methodology and stringency of diagnostic criteria, geographic area, period of observation, genetic differences and varying exposure to toxic agents etc.

Conclusion:

Pancytopenia is a common entity in our clinical practice. Bone marrow aspiration and biopsy is an important diagnostic test for patient management. Hypoplastic bone marrow, haematological malignancy and megaloblastic anaemia are the most common cause's pancytopenia. In our study common causes are haematological malignancy and hypoplastic marrow. However, uncommon and rare causes such as myelofibrosis, hairy cell leukaemia, storage disease and infection etc should be kept in mind during complete work up.

Conflict of Interest: None.

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