Etiology of pancytopenia in patients presenting at tertiary care hospital in Islamabad

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Abstract

Objective: To find the common etiological factors causing pancytopenia in patients presenting to tertiary care hospital in Islamabad

Study Design: Cross sectional observational study

Place and duration of study: The study was conducted within the department of Hematology (Pathology), Pakistan institute of medical sciences (PIMS) Islamabad from January 2018 to June 2018

Patients and Methods: Total 50 patients were included in this study. Proper history was taken from all patients and a thorough physical examination was also performed and all findings were documented. All base line investigations were done before performing bone marrow aspiration. Investigations were done from the laboratory within the hospital. CBC, serum profile, bleeding and clotting profile were checked before performing procedure. Data of each patient was documented properly. Consent was taken from all patients and also from the in charge of pathology department for conducting study. Data was analyzed using Microsoft office and SPSS version 2012. Data was expressed in the form of tables.

Result: 260 patients from different units were received for bone marrow biopsy during 6 months duration. 50 patients out of 260(19%) were having pancytopenia. The most common cause of pancytopenia was found to be megaloblastic anemia (18%), followed by hypersplenism (16%) and infection related changes (16%). Megaloblastic anemia was most commonly found in the middle aged population (>40 years of age) in the study.

Conclusion: The study showed that single most common cause of pancytopenia in adult population is megaloblastic anemia, followed by hypersplenism and overwhelming infection. Bone marrow examination is most useful investigation in understanding the etiology of pancytopenia.

Key words: Pancytopenia, Megaloblastic anemia, bone marrow aspirate

INTRODUCTION

Pancytopenia is defined as a concurrent occurrence of anemia, leucopenia and thrombocytopenia. The most common clinical manifestations of pancytopenia are pallor, fever, fatigue, weight loss, bleeding, hepatomegally, splenomegally and lymphadenopathy. Pancytopenia is becoming a common disease with the passage of time. It is due to increasing exposure of population to radiation waves. Pancytopenia may be secondary to drugs reaction such as cytotoxic drugs. Chemotherapy done against malignancy causes pancytopenia commonly. Bone marrow tumors also have similar presentation. Low level of HB causes anemia, lethargy and weakness. Low level of leucocytes causes immune deficiency and patient becomes more susceptible to disease and mild disease becomes complicated.

Common causes of pancytopenia include aplastic anemia (AA), megaloblastic anemia, acute leukemia, myelodysplastic syndrome (MDS), bone marrow infiltration by lymphoma, severe infections, fibrosis and hypersplenism. The frequency of various conditions causing pancytopenia varies in different western and local studies. Documentation of patients’ history and physical examination was done. Complete blood counts were done using automated blood analyzer. Bone marrow aspiration and biopsy were done following standard protocols and evaluated microscopically. Data of each patient was documented properly. Consent was taken from all patients and also from the in charge of pathology department for conducting study. Chemotherapy done against malignancy causes pancytopenia commonly. Bone marrow tumors also have similar presentation. Low level of HB causes anemia, lethargy and weakness. Low level of leucocytes causes immune deficiency and patient becomes more susceptible to disease and mild disease becomes complicated. Investigations were done from the laboratory within the hospital. CBC, serum profile, bleeding and clotting profile were checked before performing procedure. Data of each patient was documented properly. Consent was taken from all patients and also from the in charge of pathology department for conducting study.

In our population very little research has been done on pancytopenia. The purpose of this study is to find the frequency and underlying causes of pancytopenia in our patients.

Patients and Methods

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This is a cross sectional type of study done in PIMS hospital Islamabad during six months duration. Total 50 cases were studied. Adult male and female patients of age 13 years and above with pancytopenia were included. Pancytopenia was considered if patients hemoglobin was <10g/dL, leukocytes <4000/dL and platelets <150×10^9/L). Diagnosed cases of malignancies were excluded from the study.

Data of each patient was documented properly. Consent was taken from all patients and also from the in charge of pathology department for conducting study. Two milliliters of blood was taken from every patient, in EDTA tube from the antecubital vein under aseptic measures for complete blood count (CBC) and peripheral blood film. Complete blood count was done on automated hematology analyzer Sysmex XP100

Peripheral blood film was made on clean slide for examination under microscope. Bone marrow aspirate and biopsy were done after informed consent with standard technique under local anesthesia and aseptic measures. Stained slides of the bone marrow aspirate and trephine were examined microscopically and diagnosis was made on microscopic findings.

Data was analyzed statistically, using SPSS version 16 for parameters which included age, sex and underlying cause of pancytopenia.

The patients were divided into following groups: adolescents (13-18 years), Adults (>18 -40 years), middle aged (>40-60 years) and elderly (>60 years).

**RESULTS**

50 patients age 13 to 90 years were included in this study over a period of 6 months. There were 22 (44%) males and 28 (56%) females, showing a male to female ratio of 0.7:1. Ages of the patients varied from 13 years to 92 years with a mean age of 41.2 years and median age of 40 years. Pancytopenia was seen in 11(22%) adolescents; 17(34%) adults; 15(30%) middle-aged and 7(14%) elderly. It was seen that megaloblastic anemia is a most common cause of megaloblastic anemia with 18%. Hypersplenism was cause in 8(16%) cases. Other causes include reactive bone marrow 6(12%), infections 8(16%), Fibrosis and necrosis 2(4%), Aplastic anemia was found in 4(8%). Erythroid hyperplasia was found in only one case as a cause of pancytopenia. Metastasis to bones as a cause of pancytopenia was seen in 1(2%) case. It was seen that adults were more involved than other age groups.

**DISCUSSION**

Many studies have been done all over the world related to pancytopenia and its causes but insufficient data available in our country. There was insufficient data available in our country.

**Table-1: Distribution of etiology of pancytopenia (n=50)**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Causes of pancytopenia</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Megaloblastic Anemia</td>
<td>9(18%)</td>
</tr>
<tr>
<td>2</td>
<td>Hypersplenism</td>
<td>8(16%)</td>
</tr>
<tr>
<td>3</td>
<td>Infection related changes</td>
<td>8(16%)</td>
</tr>
<tr>
<td>4</td>
<td>Reactive bone marrow</td>
<td>6(12%)</td>
</tr>
<tr>
<td>5</td>
<td>Aplastic Anemia</td>
<td>4(8%)</td>
</tr>
<tr>
<td>6</td>
<td>Hypoplastic bone marrow</td>
<td>4(8%)</td>
</tr>
<tr>
<td>7</td>
<td>Mixed deficiency anemia</td>
<td>2(4%)</td>
</tr>
<tr>
<td>8</td>
<td>Fibrosis/Necrosis</td>
<td>2(4%)</td>
</tr>
<tr>
<td>9</td>
<td>Erythroid hyperplasia</td>
<td>1(2%)</td>
</tr>
<tr>
<td>10</td>
<td>Metastasis</td>
<td>1(2%)</td>
</tr>
<tr>
<td>11</td>
<td>Others(HLH, PNH, MM,iron def)</td>
<td>5(10%)</td>
</tr>
</tbody>
</table>

**Table-2: Distribution of pancytopenia according to age**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Causes of pancytopenia</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescents (13-18 years) N=11</td>
<td>Aplastic anemia Megaloblastic anemia Iron deficiency anemia Hypoplastic bone marrow Erythroid hyperplasia HLH Infection related changes Mixed deficiency anemia</td>
<td>3 2 1 1 1 1 1 1</td>
</tr>
<tr>
<td>Adults (&gt;18-40 years) N=17</td>
<td>Reactive bone marrow Hypersplenism Infection related changes Hypocellular bone marrow Megaloblastic anemia Aplastic anemia Lymphoma Fibrosis</td>
<td>5 4 2 2 1 1 1 1</td>
</tr>
<tr>
<td>Middle aged (&gt;40-60 years) N=15</td>
<td>Megaloblastic anemia Infection related changes Hypersplenism Reactive bone marrow Hypocellular bone marrow Multiple myeloma Fibrosis/ Necrosis</td>
<td>4 4 3 1 1 1 1</td>
</tr>
<tr>
<td>Elderly (&gt;60 years) N=07</td>
<td>Megaloblastic anemia Infection related changes PNH Hypersplenism Mixed deficiency anemia Metastasis/ Infiltration</td>
<td>2 1 1 1 1 1</td>
</tr>
</tbody>
</table>

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intense need to study this disease and its related causes. Pancytopenia is becoming a common disease with the passage of time. It is due to increasing exposure of population to radiation waves. Pancytopenia may be secondary to drugs reaction such as cytotoxic drugs. Chemotherapy done against malignancy causes pancytopenia commonly. Bone marrow tumors also have similar presentation. Low level of HB causes anemia, lethargy and weakness. Low level of leucocytes causes immune deficiency and patient becomes more susceptible to disease and mild disease becomes complicated. Data of each patient was documented properly. Consent was taken from all patients and also from the in charge of pathology department for conducting study. Two milliliters of blood was taken from every patient, in EDTA tube from the antecubital vein under aseptic measures for complete blood count (CBC) and peripheral blood film. Common causes of pancytopenia include aplastic anemia (AA), megaloblastic anemia, acute leukemia, myelodysplastic syndrome (MDS), bone marrow infiltration by lymphoma, severe infections, fibrosis and hypersplenism. The frequency of various conditions causing pancytopenia varies in different western and local studies. Documentation of patients’ history and physical examination was done. Complete blood counts were done using automated blood analyzer. Bone marrow aspiration and biopsy were done following standard protocols and evaluated microscopically. Data of each patient was documented properly. Consent was taken from all patients and also from the in charge of pathology department for conducting study. Peripheral blood film was made on clean slide for examination under microscope. Bone marrow aspirate and biopsy were done after informed consent with standard technique under local anesthesia and aseptic measures. Stained slides of the bone marrow aspirate and trephine were examined microscopically and diagnosis was made on microscopic findings. Pancytopenia is defined as a concurrent occurrence of anemia, leucopenia and thrombocytopenia. The most common clinical manifestations of pancytopenia are pallor, fever, fatigue, weight loss, bleeding, hepatomegally, splenomegally and lymphadenopathy. The most common clinical manifestations of pancytopenia are pallor, fever, fatigue, weight loss, bleeding, hepatomegally, splenomegally and lymphadenopathy. Pancytopenia is becoming a common disease with the passage of time. It is due to increasing exposure of population to radiation waves. Chemotherapy done against malignancy causes pancytopenia commonly. Similar study was done by Shimamura et al in which they studied anemia related to aplastic anemia and this study was published in 2008. Other studies by Jha et al and Anesoft published in 2008 and 2001n respectively explained aplastic anemia and its presentation.

**Conclusion:** Aplastic anemia is becoming very common with the passage of time. The study showed that single most common cause of pancytopenia in adult population is megaloblastic anemia, followed by hypersplenism and overwhelming infection. Bone marrow examination is most useful investigation in understanding the etiology of pancytopenia.

**REFERENCES**


