DIAGNOSIS OF THE SEVERELY ANAEMIC PATIENTS USING THE BONE MARROW ASPIRATION BIOPSY TECHNIQUE

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SUMMARY
Objective: To highlight the usefulness of bone marrow aspiration in the diagnosis of severely anaemic patients.
Methods: Fifty two patients, 26 males and 26 females aged 16 to 40 years were drawn from the wards and clinics of University of Benin Teaching Hospital, Benin. The criteria for inclusion in the study were unexplained anaemia; suspicion of leukaemia and aplastic anaemia. Patients with easily diagnosable haemoglobinopathies such as HbSS were excluded from the study. Bone marrow aspirated from either the patients' anterior or posterior superior iliac spine were stained and examined. Smears were fixed in alcohol, stained with Leishman stain and examined under the microscope. Pearl's stain for haemosiderin is used to confirm presence of iron in the marrow.
Results: The smears were suggestive of acute myeloblastic leukaemia in 21 out of 52 patients or 40.4%; acute lymphoblastic leukaemia in 10 out of 52 patients or 19.2%; and megaloblastic anaemia in 5 patients or 9.6%. Hypocellularity was confirmed in 15 (28.9%) patients.
Conclusion: It is concluded that bone marrow aspiration with the Klime-Salah needle is a practical and cheap technique for the diagnosis of the severely anaemic patient.

Key Words: Severe Anaemia, Bone Marrow Aspiration, Diagnostic Biopsy

INTRODUCTION

Bone marrow aspiration with subsequent preparation of Leishman stained films is already a well established procedure. Its uses have been highlighted in previous studies. It is usually performed with a Klime-Salah needle, with dimensions of 16G x 2 inches or 15mm length. The procedure is usually indicated for establishing a diagnosis of unexplained anaemia; pancytopenia; unexplained splenomegaly; suspected leukaemia; and a host of other conditions. The bone marrow aspiration technique also offers the haematologist the opportunity to assess the cellularity of the bone marrow and the iron stores.

Few reports have discussed the usefulness of bone marrow aspiration in this environment. Ahmed et al. in a previous study examined the morphological features in anaemic patients with acquired immune deficiency syndrome in Maiduguri, Nigeria.

Due to the increasing number of patients encountered in recent times that have unexplained anaemia, it has become necessary and justified to perform this study in order to demonstrate the effectiveness of bone marrow aspiration in aiding the diagnosis of severe unexplained anaemia. By obtaining an accurate diagnosis, patient care would be enhanced.

MATERIALS AND METHODS

Fifty two patients (26 males and 26 females) aged 16-40 years were selected and studied over the period November 1997 to May 2001. The patients were drawn from the Haematology clinic and wards of the University of Benin Teaching Hospital (UBTH), Benin City while the bone marrow aspirate and smears were prepared in the Haematology Laboratory of the UBTH, Benin City. Verbal consent was
obtained from each patient or patient’s relation in case of minors, prior to the study.

Inclusion criteria included the presence of unexplained anaemia, suspicion of leukaemia and aplastic anaemia. Prior to bone marrow aspiration, each patient had the following ancillary tests: blood film report, haemoglobin estimation and haemoglobin genotype using the cellulose acetate strip to exclude haemoglobinopathies. Patients with confirmed sickle cell haemoglobinopathy (HbSS), were excluded from the study as this group of patients are known to have low haemoglobin concentration and their diagnosis can readily be made using haemoglobin electrophoresis.

The bone marrow aspirate was obtained in all patients from either the anterior or posterior superior iliac spine. The site of aspiration and surrounding skin were cleaned with an antisepptic solution and draped. After infiltration with 1% xylocaine the Klime-Salah needle was used to penetrate the skin and advanced into the bone until a reduction in pressure was felt. At this point, the stylet was removed and a 10ml syringe attached to the outer needle. A small quantity of bone marrow was then aspirated and smears immediately made on clean glass slides. The smears were subsequently fixed in absolute alcohol and left to dry. Each slide was subsequently stained with Leshman stain and viewed under the microscope.

Analysis was with the Student t-test. P value of less than 0.05 was considered statistically significant.

RESULTS

Table 1 shows the various appearances observed in the bone marrow of the 52 patients studied. Of these patients 21 (40.4%) consisting of 8 males and 13 females had numerous myeloblasts in the bone marrow smear. This was suggestive of acute myeloblastic leukaemia. In 5 (9.6%) patients, all females, there was evidence of megaloblastosis in keeping with megaloblastic anaemia associated with pregnancy and folate deficiency.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Myeloblastic Anaemia</td>
<td>8</td>
<td>13</td>
<td>21</td>
<td>40.4</td>
</tr>
<tr>
<td>Aplastic Anaemia</td>
<td>8</td>
<td>7</td>
<td>15</td>
<td>28.9</td>
</tr>
<tr>
<td>Acute Lymphoblastic Anaemia</td>
<td>9</td>
<td>1</td>
<td>10</td>
<td>19.2</td>
</tr>
<tr>
<td>Megaloblastic Anaemia</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>9.6</td>
</tr>
<tr>
<td>Unascertained</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>26</td>
<td>52</td>
<td>100.0</td>
</tr>
</tbody>
</table>

a Presence of Myeloblasts and Myelocytes
b Presence of Hypocellularity with > 75% fat cells
c Presence of lymphoblasts, increased nucleus/cytoplasm ratio and presence of nucleoli
d Anaemia in pregnancy

Table 2 shows the mean and Hb ±SEM for the 52 patients. There was no difference between the mean ages of the male and female patients. However, the males had a higher mean haemoglobin concentration of 4.5mg% as against 3.38±1.15 for the females (p<0.05).

Table 2: Mean Age and Hb in 52 Patients

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Male (n = 26)</th>
<th>Female (n = 26)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age ± SEM</td>
<td>21.92 ± 1.85</td>
<td>22.38 ± 1.67</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Mean Hb ± SEM</td>
<td>4.50 ± 0.00</td>
<td>3.38 ± 1.15</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

Figures 1, 2 and 3 show a film each of a patient with megaloblastosis, acute lymphoblastic leukaemia and hypocellularity respectively.
DISCUSSION

This study reveals the usefulness of the bone marrow aspiration technique as a useful and practical diagnostic tool for confirming the diagnosis of various haematological disorders. Without the benefit of bone marrow aspiration it would have been difficult to arrive at a diagnosis in this environment for conditions such as acute myeloblastic leukaemia; acute lymphoblastic leukaemia; megaloblastic anaemia in pregnancy; and hypocellularity of the bone marrow.

In a previous report on the evaluation of bone marrow findings in 166 severely anaemic patients Kumar et al. in India, reported aplastic anaemia in 49 patients; megaloblastic anaemia in 37 patients; leukaemia or lymphoma in 30 patients; and hypersplenism in 19 patients. They however, excluded patients with leukaemic cells in their peripheral blood smears. Their study result is similar to ours and illustrates the usefulness of bone marrow aspiration biopsy as a diagnostic tool.

A previous study by Hammerstrom in Norway also corroborates our finding on the benefits derivable from bone marrow aspiration biopsy. The Norwegian study revealed that the diagnostic yield was highest for conditions related to bone marrow function and low for unspecific conditions such as fever of unknown origin. The selective use of bone marrow aspiration is advocated especially for cases of reticulocytopenia.

Trephine bone marrow biopsy has been recommended as a useful adjunct to bone marrow aspiration in this environment by Okafor. Kumar et al. also advocated the use of both aspiration and biopsy simultaneously in pancytopenic patients when diagnosis is elusive.

This study reveals that a good proportion of severely anaemic patients seen in this environment, excluding those with sickle cell anaemia, may have some form of leukaemia. Others may have hypocellularity of the bone marrow probably due to aplastic anaemia while megaloblastic anaemia accounts for a few cases. It is not easy to explain the reason for the frequency order but there is a need for prompt
referral of severely anaemic patients to the haematologist.

CONCLUSION

It is concluded that bone marrow aspiration is capable of confirming the diagnosis of unexplained severe anaemia. This is pertinent because in this environment, most hospitals and clinics do not have the facilities for the more sophisticated and expensive tests necessary for diagnosis of haematological disorders such as karyotyping for chromosomal abnormalities, various assays for serum iron and a host of other tests.

In view of the low cost involved in procuring the bone marrow aspiration needle and the ease of the technique, it is advocated that provisions be made for the procedure in various health care institutions.

ACKNOWLEDGEMENT

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REFERENCES