Original article:

Study of advantages and disadvantages of bone marrow trephine biopsy over bone marrow aspiration

[1]Dr . Smita Bhadekar * , [2]Dr.Sunita Patil

[1]Assistant Professor, Dept. of Pathology, BJGMC, Pune

[2]Associate Professor, Dept. Of Pathology, BJGMC, Pune

Corresponding author *

ABSTRACT

INTRODUCTION: In general, the patients with hypocellular bone marrow or bone marrow fibrosis are more likely to need a trephine biopsy for adequate assessment. In such patients, an aspirate will probably be inadequate or even impossible.[

MATERIALS AND METHODS: This was the prospective study carried out in our institute for 2 years duration. We studied 42 cases of Bone Marrow Biopsy received in department of pathology. Detail clinical history and physical examination was done as per proforma annexed.

RESULTS: In present study maximum cases were diagnosed on bone marrow biopsy, as we received bone marrow biopsy many times in cases where bone marrow aspiration was dry tap or diluted with peripheral blood .Simultaneous procedure was followed only in few cases.

CONCLUSION: Bone marrow biopsy alone was useful in diagnosis of 38.09% patients, bone marrow aspiration was supportive for diagnosis on biopsy in 35.7% patients, while in 7.14% patients only bone marrow aspiration was sufficient to form Haematological Diagnosis.

INTRODUCTION

In general, the patients with hypocellular bone marrow or bone marrow fibrosis are more likely to need a trephine biopsy for adequate assessment. In such patients, an aspirate will probably be inadequate or even impossible.[1]

In cases where bone marrow aspiration is diluted, bone marrow biopsies or marrow clot sections are studied to avoid this pitfall. In patients with Non-Hodgkin's lymphoma (NHL), examination of the bone marrow biopsy is an important part of the staging procedure and it is useful for assessing the response to treatment and re-staging when patients relapse after treatment. [2]Bone marrow aspiration and biopsy are complementary in diagnosing cases of acute leukaemia, chronic lymphocytic leukaemia, and chronic myelogenous leukaemia. Biopsy is of particular value in patients with inadequate aspirate specimens (or dry taps) with packed or empty marrows in acute leukaemia.[3]

Similarly, only a trephine biopsy shows the architecture of the bone marrow and permits the detection of abnormal distribution of cells, bone marrow granulomas, and focal lymphoid infiltrates. The present studydeals with assessment of diagnostic utility of bone marrow trephine biopsy,over the other conventional methods like bone marrow aspiration technique,in the diagnosis of haematological disorder.

MATERIALS AND METHODS

This was the prospective study carried out in our institute for 2 years duration.

We studied 42 cases of Bone Marrow Biopsy received in department of pathology. Detail clinical history and physical examination was done as per proforma annexed.

Patients were investigated for following:

Blood in EDTA bulb received from concerned departments, was processed for haematological parameters mentioned in proforma on Electronic cell counter i.e. Mythic and Erma.

Peripheral Blood Smear:

PBS was obtained and was stained by Leishman stain. Peripheral smear examination was done systematically under low power, high power and oil immersion.

Bone Marrow Aspiration:

We received spreaded bone marrow aspiration slides which were without anticoagulant to avoid storage artefact and also 0.2-0.3ml of marrow contents in bottle containing EDTA. They then were stained with Leishman's stain.

OBSERVATIONS & RESULTS

Forty two cases admitted in our institute, as in-patients from December 2010 to October 2012 for the evaluation of various haematological disorders were studied.

In the present study 14 cases of acute leukemia were less than 10 years of age group, 7 cases in 11-20 years age group,1 case in 31-40 years age group. 5 cases of aplastic/ hypoplastic marrow were in less than 10 years age group. Normal marrow was seen in 6 cases in less than 10 year age group,3 cases in 11-20 years age group, one patient in 21-30 years, one patient in 61-70 year age group. Inadequate marrow one case was less than 10 years age group and 2 cases were in 11-20 years group.

Table 1:**Distribution of study sample according to main clinical features and laboratory Findings:**

Clinical and laboratory investigations	Number of cases/42	% of cases
Pallor	40	95.23
Fever	32	76.19
Hepatomegaly	24	57.14
Blast in peripheral blood	22	52.38
Splenomegaly	18	42.85
Pancytopenia	15	35.71
Lymphadenopathy	15	35.71
Body weakness	08	19.04
Bleeding	05	11.90

www.ijbamr.com P ISSN: 2250-284X , E ISSN : 2250-2858

In the present study,the commonest presenting sign and symptoms were pallor in 95.23% cases,fever in 76.19% and hepatomegaly in 57.14%. Blast cells were seen in 52.38% cases.

Acute leukaemia was studied by making co-relation of clinical features,peripheral smear, bone marrow aspiration and bone marrow biopsy.

Amongst the 22 cases diagnosed as acute leukemia, acute lymphoblastic leukemia was found in 12 cases (28.57%) and acute promyelocytic leukaemia in one case(2.38%), acute leukaemia remained unclassified in 9 cases(21.4%).

Among these 9 cases of (unclassified) leukemia were 4 males and 5 females. Males presented in the age group of 1-20 years.4 females ranged in 1 to 10 years and one female was of 35 years.All patient presented with fever, generalized weakness,pallor, hepatospleenomegaly,lymphadenopathy, joint pain,black stools, bleeding from gums and rash on body.

On peripheral smear examination all cases showed blast count from 10-85%. Blast cells had large round nuclei with 2-4 nucleoli and scanty rim of cytoplasm.Platelets were depleted in all patients Myeloperoxidase stain(MPO) was negative in all cases. On Trephine biopsy all the nine cases showed hypercellular bone marrow.Intertrabecular spaces were totally replaced by large monotonous cells with hyperchromatic nuclei and scanty cytoplasm.All other series were suppressed.

Further Immunophenotyping was advised. . Acute lymphoblastic leukaemia was diagnosed by considering clinical features,peripheral smear,bone marrow aspiration and bone marrow biopsy.

Acute Lymphoblastic Leukaemia was diagnosed in 12 cases(28.57%)where the blast morphology was clearly suggestive of lymphoblastic nature.

Peripheral smear,bone marrow aspiration and bone marrow biopsy findings in 8 patients. Peripheral smear ranged from normocytic normochromic to dimorphic anaemia with thrombocytopenia. All demonstrated blasts in peripheral blood ranging from 5-70%.Blast cells had large round nuclei with 1-2 inconscpicuous nucleoli and scanty rim of cytoplasm.

Bone marrow aspiration was diluted with peripheral blood in 3 cases.In other 5 cases bone marrow was hypercellular and demonstrated blast cells from 50-70%.Blasts cells had large nucleus with 1-2 nucleoli,scanty rim of cytoplasm.Some cells showed cleaved nuclei.

Special stain Myeloperoxidase was negative.n trephine biopsy they were hypercellular. Intertrabecular spaces were totally replaced by large monotonous cells with hyperchromatic nuclei with scanty cytoplasm. Myeloid, erythroid and megakaryocytic series were suppressed.

DISCUSSION

In present study common clinical features were pallor in 95.23% cases, fever in 76.19% cases, hepatomegaly in 57.14% cases and splenomegaly in 42.85% cases. Also in present study on peripheral smear blasts percentage was high in 52.38% patients as compared to other studies as the number of leukaemia cases were high.

Present study is comparable to study by Mohammad Saeed et al (2010)[4] Nitin gupta et al (2010)[5] in their study found Acute leukaemia in 20 patients(50%).They further classified it into acute myeloid leukaemia in 12 patients and acute lymphoblastic leukaemia in 8 patients. Mohammad et al (2010) [4] in their study divided 11 patients(9.40%) of acute leukaemia into 5 patients of acute Myeloid Leukaemia, 3 patients of acute lymphoblastic leukaemia and 3 patients were unclassified.

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In present study acute Leukaemia was found in 52.38% patients.High percentage of acute leukaemia was observed as our institute has a cancer therapy center. Acute leukaemia was studied by making correlation of clinical features, peripheral smear, bone marrow aspiration and bone marrow biopsy findings. After all this study we got acute lymphoblastic leukaemia in 12 cases (28.57%), acute promyelocytic leukaemia in one case(2.38%) and acute leukaemia(unclassified) in 9 cases(21.4%). In study by Mohammad Saeed.et al.(2010) patients were in the age group of 2-76 years,however maximum patients of leukaemia belonged to 1st and 2nd Decade of life**.** In present study 63.63% patients presented in less than 10 years age and 31.81% in 11-20 years. The present study is comparable to study by Mohammad Saeed et al (2010) [4.]

In present study 22 patients were of acute leukaemia, among which 57.14% were males and 42.8% were females. We got male dominance, which was similar to Mohammad Saeed et.al in 2010.[.] In a study by Muhammad Idris et al (1999-2001) [47], they found acute lymphoblastic leukaemia in 19.15% cases, Afzal Khan et al (2008) [49] found acute lymphoblastic leukaemia in 11.6% cases.

In present study acute lymphoblastic leukaemia was found in 28.57% patients which is higher than other studies.

In study by Afzal Khan et al (2008) [6],common age group of presentation in ALL was 1-5 years.

In a study by Pathak et al (2012) [7,]common age group was 15-30 years followed by 30-45 years,Maximum ALL patients was found in adults.

In present study 66.66% patients presented in less than 10 years of age and 33.33% in 11-20 years of age group.

In present study among 12 patients of ALL,9 (75%) patients were males and 3 (25%) patients were females. We got male dominance which was also found in other studies.

Blood and bone marrow examination revealed promyelocytes showing a few fine granules and occasional Auer rods. Based on this morphology and cytochemistry, they diagnosed the case as acute promyelocytic leukaemia.

In present study, one case of 8 years female presented with fever, weakness, lymphadenopathy and hepatomegaly. On Peripheral smear examination bilobed promyelocytic cells with inconspicuous nucleoli were 20% and platelets were depleted. Bone marrow aspiration was hypercellular bone marrow with myeloid hyperplasia with promyelocytic count 35%. Myeloperoxidase stain was positive. Bone Marrow trephine biopsy showed hypercellular marrow packed with immature myeloid cells. Erythroid and megakaryocyte series were suppressed.

In the present study, 38.09% cases which had dry tap on aspiration (haemorrhagic or scanty) diagnosis was given on biopsy.Bone marrow aspiration and biopsy was complementary in 35.71% cases. In 7.14% cases bone marrow aspiration was positive and in them biopsy was inadequate. In present study maximum cases were diagnosed on bone marrow biopsy, as we received bone marrow biopsy many times in cases where bone marrow aspiration was dry tap or diluted with peripheral blood .Simultaneous procedure was followed only in few cases.

CONCLUSION

Bone marrow biopsy alone was useful in diagnosis of 38.09% patients, bone marrow aspiration was supportive for diagnosis on biopsy in 35.7% patients, while in 7.14% patients only bone marrow aspiration was sufficient to form Haematological Diagnosis.

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