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Pathology

ROLE OF BONE MARROW ASPIRATION AND MARROW BIOPSY IN HAEMATOLOGICAL DISORDERS

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ABSTRACT **Background:** Bone marrow aspiration and bone marrow trephine biopsy are the two procedures done for the diagnosis of both hematological and non-hematological disorders and are complimentary to each other. **Aim and Objective:** To study the essential haematological evaluation of cases where bone marrow aspiration and bone marrow biopsy is indicated and to correlate the findings of bone marrow aspiration and bone marrow biopsy in diagnosing various haematological disorders. **Material and Methods:** The study was done on 86 patients in the age group 10-80 years. All had undergone simultaneous bone marrow aspiration and bone marrow biopsy procedures in the department of Clinical Haematology in a tertiary hospital. Standard methods were followed for bone marrow aspiration and biopsy procedure and for staining and evaluation of cellular aspirate. **Observation & Results:** The Male to Female ratio of 1.4:1; 60% of patients belonged to 20-60years group. Bone marrow and aspiration yield high diagnostic evaluation in megaloblastic anaemia (89.47%) against aspirates (10.52%) with p value of 0.00086 while in aplastc anaemia the aspirate evaluation shows better diagnostic yield (p value of 0.285). **Conclusion:** A combination of bone marrow aspiration and bone marrow biopsy give a better morphology of the cells and with good picture of the architecture and pattern of distribution of the cells. There is high diagnostic yield in evaluation of anemia.

KEYWORDS : Bone Marrow aspiration -Biopsy-Anaemia.

INTRODUCTION:

The Bone marrow aspiration is the most frequent and safe invasive procedure done in a routine manner in the hospitals for the diagnosis and management of haematological disorder[1]. Bone marrow biopsy is often performed as part of the aspiration procedure and can provide more specific informations about the cellularity of marrow and the extent of disease.[2]. Bone marrow examination is also part of the staging process for newly diagnosed patients with lymphoproliferative diseases and certain nonhematopoietic malignancies such as neuroblastoma and other childhood tumors [3,4,5]. Marrow evaluation is essential to determine the efficacy of treatment and to monitor the recovery process in patients undergoing bone marrow transplantation or marrow ablative chemotherapy [6,7].Both the procedures are complementary to each other for high diagnostic evaluation. The aim of this study the evaluation of cases where bone marrow aspiration and bone marrow biopsy is indicated and to correlate the findings of bone marrow aspiration and bone marrow biopsy in diagnosing various haematological disorders.

MATERIAL AND METHODS:

The present study is a hospital based observational study which is being carried out in the department of clinical haematology and Deptt of Pathology of Gauhati Medical College and Hospital (GMCH). The study was done on 86 patients who were clinically suspected of haematological disorders and had undergone simultaneous bone marrow aspiration and bone marrow biopsy procedures.The bone marrow aspiration and bone marrow biopsy samples were collected from the study group and respective smears were prepared. All the smears and sections were being reviewed for morphological details and findings and the data recorded .Wintrobe's method was followed for bone marrow aspiration and biopsy procedure[8]. May–Grünwald– Giemsa stain[9] was used for marrow aspirate for evaluation. Perls ' stain for Iron was used evaluation and Gomori's method for reticular fibers[10] was used. Fisher exact test was used for statistical evaluation. P value<0.05 was considered as significant.

RESULTS AND OBSERVATIONS :

A total of 86 patients who had undergone both bone marrow aspiration and bone marrow biopsy for evaluation of haematological disorder of all age group. The majority of the cases belonged to the age group (51 to 60) years (24.41%) , followed by (41 to 50) years (20.93%) and (31 to 40) years (17.4%) with the male female ratio of 1.4:1(Table 1,2). The clinical indications for BMA and Biopsy were anemia for evaluation (28 ; 32.55%),followed by pancytopenia (23; 26.74%) and fever/PUO (19; 22.09%),hepatosplenomegaly (10,11.62), Others(6;6.9%). The results showed that the was high diagnostic evaluation in Megaloblastic anaemia where evaluation was done in concordance with both BMA +BMB (17 patients, 89.47%) against Aspirate alone(2 patients, 10.52%) with high significance(p=0.00087). Similar results were obtained in Multiple myeloma, Acute Leukemia and Aplatic Anemia with high significance.The overall p-value is 0.00049 with 95% confidence Interval(CI) of 1.78 to 6.23) with odd ratio of 3.2 (Table 3)..

Table 1: Age Distributions:

Age (Years)	Nos of cases(%)
1-10	4(4.65)
11-20	5(5.81)
21-30	11(12.79)
31-40	15(17.44)
41-50	18(20.93)
51-60	21(24.41)
61-70	8(9.30)
71-80	1(1.16)
81-90	3(3.48)

Table 2: Sex distributions

Sex	Nos(%)
Male	50(58.13)
Female	36(41.86)
Total	86(100%)

Table 3: Results of BMA & Biopsy

Diagnosis	BMA+BMB (%)	BMB (%)	P value
Megaloblastic Anaemia	17(89.47)	2(10.52)	0.00086
Multiple Myeloma	17(94.44)	1(5.66)	0.00057
Acute Leukemia	18(85.71)	3(14.28)	0.00015
Aplastic Anaemia	2(28.71)	5(71.42)	0.285
Chronic Myeloid Leukemia	1(50%)	1(50)	
Nutritional Anaemia	5(100)	0	
Hodgkin Lymphoma	1(100)		
Non Hodgkin Lymphoma	1(33.3)	2(66.7)	

Granulomatous Inflammation	0	1	
Metastatic deposits	0	1	
Primary myelofibrosis	0	1	
Myelodysplastic Syndrome	3(100)	0	
Normal	0	3(100)	
Total	66(76.74)	20(23.25)	0.00049

DISCUSSION:

The age group in our studies ranged from 4 years to 87 years. This age range matches with the studies done by other study[11].In our study, age distribution ranging 51 – 60 years (24.41%) was the most common, which is similar to study done by Gilotra M et al[11].The male to female ratio (M : F) is 1.4:1, which is quite similar to the studies of Atla BL et al[12 13] In our study the most common clinical indication was anemia (32.55%) which is similar to the other studies[13,14].The second most common indication in our study was pancytopenia (26.92%) which is similar to the study[83 11]. In our study Acute leukemia was the most common diagnosed haematological disorder comprising 24.41% of all cases which is similar to the studies[11, 14]. There were 19 cases (22.09%) of Megaloblastic anemia in our study which matches with the study[15]. In our study there was a single case of granulomatous lesion accounting 1.16% of all cases which was diagnosed by bone marrow biopsy only, which is similar to the study[14,16,17]. Regarding the other cases of anemia other than Megaloblastic anemia, our study showed a 100% concordance between BMA and BMB and 28.57% concordance in case of Aplastic anemia [18]. Our study observed 9 cases (10.46%) of dry taps which is similar to the findings observed in [19, 20]. Myeloproliferative disorder, Acute leukemia and Aplastic anemia were the most common cases presented (22.2% each) which is similar to other study[21] .

CONCLUSION:

Bone marrow examination is a very useful diagnostic tool and has a wide application in clinical practice in haematological disorders. Bone marrow aspirate gives a better morphology of the cells and trephine biopsies gives a good picture of the architecture and pattern of distribution of the cells. Although bone marrow aspiration provided significant results in various number of cases, trephine biopsies came into rescue when aspiration yielded dry tap or haemo-diluted materials. Both the procedures are complementary to each other and it may be performed together for better evaluation.

Conflict Of Interest: None

Ethical Issue: Approved by Institutional ethics committee.

Limitations:

This is a single center observational study with limited study population. Multi-center with larger population of study may influence results.

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