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Role Of Bone Marrow Aspiration In Haematological Disorders.

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Abstract:
Background: *Hematological disorders emcompass a wide spectrum of disorders ranging from nutritional anemia to various hematological malignancy. This study was performed to develop a knowhow about that spectrum with respect to age and sex in our clinical setting within the community.*
Materials and Methods: It was a retrospective study of bone marrow aspiration (BMA) done on patients who were referred for bone marrow examination. Cases were analyzed in detail regarding clinical examination and other investigations.
Results: *BMA from 556 patients were analyzed. Nutritional anemia constituted the highest number of cases among the non-malignant hematological group of which megaloblastic anemia was the most common disorder found. Acute myeloid leukemia was the commonest malignant hematological disorder in the present study. Among the 556 cases, 275 cases were males and 281 were females with the highest number of cases in the age group of 21-30 years.*
Conclusion: *Bone marrow examination is a very potent investigation to confirm the diagnosis and management of suspected hematological disorders as well as non- hematological disorders. Although an invasive procedure, it is well tolerated by patients and also helps us in reaching a final diagnosis within a short span of time.*
Keywords: *Bone marrow aspiration, Megaloblastic anemia, AML.*

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I. Introduction

The occurence of hematological disorders is relatively quite common in the community. They usually range from anemias to advanced hematological malignancies. [1] Mere clinical examination and routine investigations does not always suffice to the cause of diagnosis of such spectrum of disorders. Bone marrow aspiration is an important diagnostic tool in hematology and plays a pivotal role in confirmation of diagnosis in this regard. It is a relatively safe procedure and carried out frequently in hospitals. Though an invasive procedure, it can be easily performed even in the presence of thrombocytopenia with little or no risk of bleeding.[2] Infact, mostly nutritional anemia as well as acute leukemia are diagnosed practically by bone marrow aspiration alone. The bone marrow aspirated sample can also be used for various diagnostic assays like cytochemical stain, immunophenotyping, microbiological test, cytogenetic analysis and molecular studies .[3,4,5]

Biopsy of bone marrow is an adjunct to the study of hematological disorders which are quite frequent in all age group.[6] The spectrum of hematological disorders is relatively different in the developing world than the developed countries .[2,7] Hence, the utility of bone marrow biopsy commonly used for the evaluation of anemia, leukemia, thrombocytopenia, unexplained cytopenia, storage disorders, multiple myeloma, estimation of iron stores etc becomes very important. Although diseases of the bone marrow exhibit various clinical symptoms involving blood , the nature of the disease process cannot be determined with peripheral smears alone and without BME, the diagnosis is usually not confirmed. Acomplete diagnosis of malignancy can be made by asdpiration and bonev marrow biopsy as thet are complementary to each other.[8,9]

The present study was carried out with a view to probing into the role and utility of bone marrow aspiration in the genesis and diagnosis of etiological spectrum of various hematological disorders ranging from nutritional anemias to haematological malignancies.

II. Materials And Methods

This was a retrospective study done at the tertiary care centre in the Southern Assam at Silchar Medical College for a period of 3 years from June 2017 to May 2020. To analyze the spectrum of hematological disorders, all the cases who underwent bone marrow examination were taken into account. The sample size was ascertained on the basis of availability of data and relevant reports from the medical records department. The relevant reports of the patients were retrieved from the record files which included complete

blood count with peripheral blood smear, serology report, ultrasonography of whole abdomen etc. Special stain like Perl's stain, PAS stain were done wherever indicated. Inadequate aspirates, dry tap were excluded from the study. Windows 8

The present study also received ethical approval from the ethical committee abiding existing norms.

III. Results

During the period from June 2017 to May 2020, there were 556 patients which were included in the study and underwent bone marrow aspiration procedure. The study age ranged from 2 yrs to 82 yrs with the highest number of cases in the age group 21-30 yrs. Among 556 cases, 275(49.46%) were males and 281(50.53%) were females. The male to female ratio was 1:1.02. The age and sex distributions of these patients are shown in table 1 & table 2 respectively.

Table: 1 Age distribution of the patients who underwent bone marrow examination

AGE(YEARS)	NO. OF PATIENTS	PERCENTAGE(%)
0-10	58	10.43
11-20	100	17.98
21-30	113	20.32
31-40	106	19.06
41-50	66	11.87
51-60	53	9.53
>60	60	10.79

Table: 2 Sex –wise distribution of cases who underwent bone marrow examination

SEX	NO. OF PATIENT	PERCENTAGE(%)
Male	275`	49.5
Female	281	50.5
Total	556	100

In the present study, out of 556 cases, megaloblastic anemia(46.58%) contributed to the maximum number of cases amongst the non malignant hematological disorders followed by dimorphic anemia(12.95%), iron deficiency anemia(10.97%) and aplastic anemia(5.39%), while amongst the malignant hematological disorder, AML(6.29 %) contributed the highest number of cases followed by ALL (3.95 %), CML(2.70 %) and multiple myeloma(1.98%).

Table 3: shows findings of bone marrow examination

DIOGNOSIS	NO. OF PATIENTS	PERCENTAGE(%)
Megaloblastic anemia	259	46.58
Dimorphic anemia	72	12.95
Iron deficiency anemia	61	10.97
AML	35	6.29
Aplastic anemia	30	5.39
ALL	22	3.95
CML	15	2.70
Multiple myeloma	11	1.98
Erythroid hyperplasia	10	1.80
TB	7	1.28
Metastasis	4	0.72
ITP	4	0.72
MPN	2	0.36
MDS	1	0.18
Histoplasmosis	1	0.18
Normal	22	3.95
Total	556	100

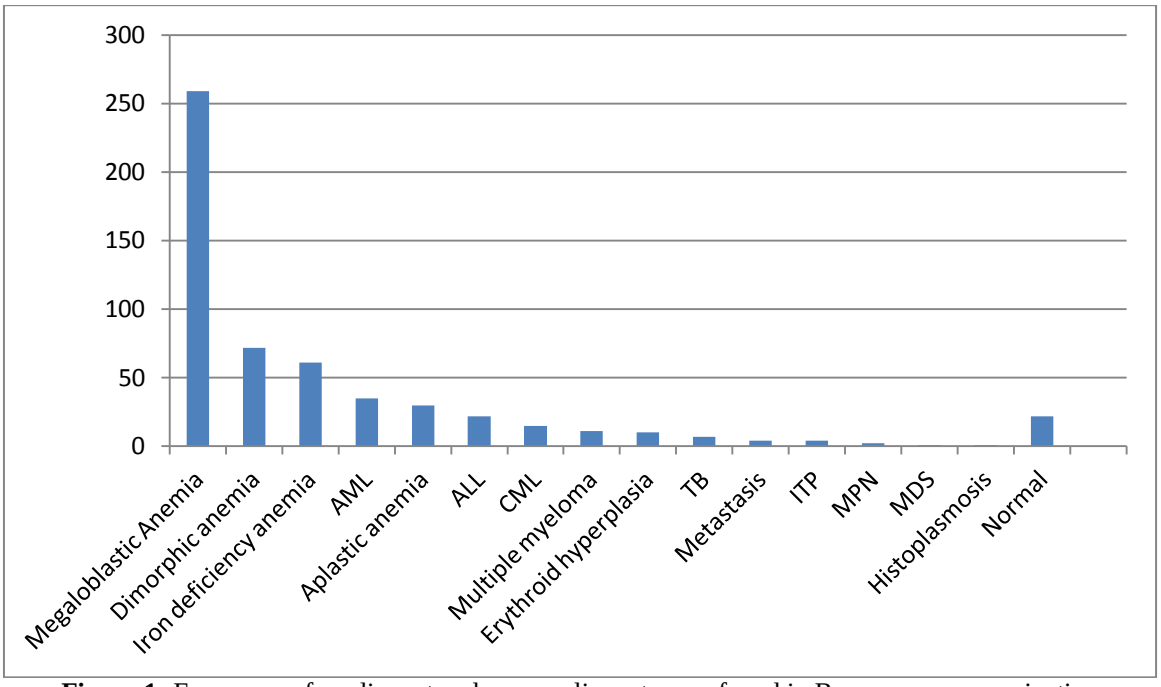

Figure 1: Frequency of malignant and non- malignant cases found in Bone marrow examination

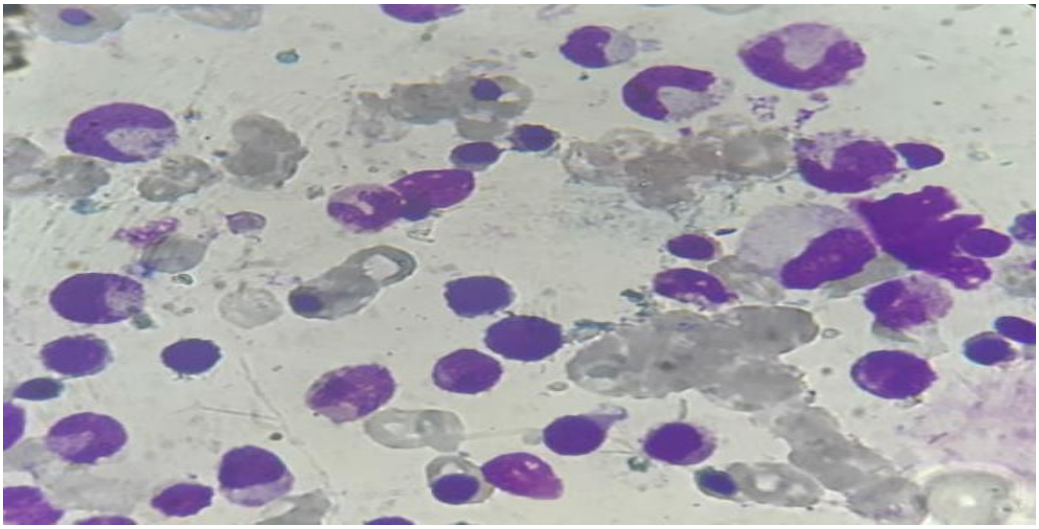

Figure 1: BMA of Megaloblastic anemia, HPF, Giemsa

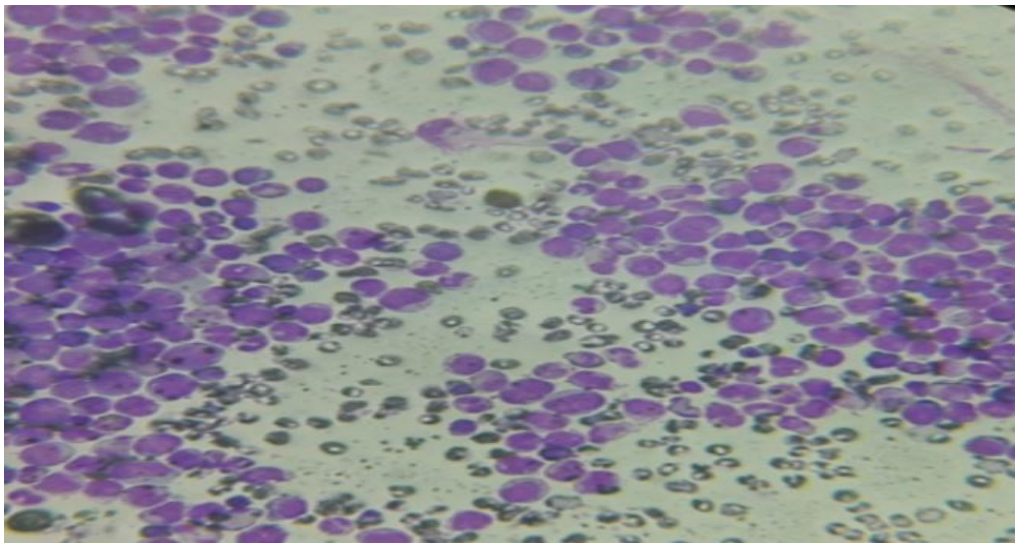

Figure 2: BMA of Acute leukemia ,Low power, Giemsa

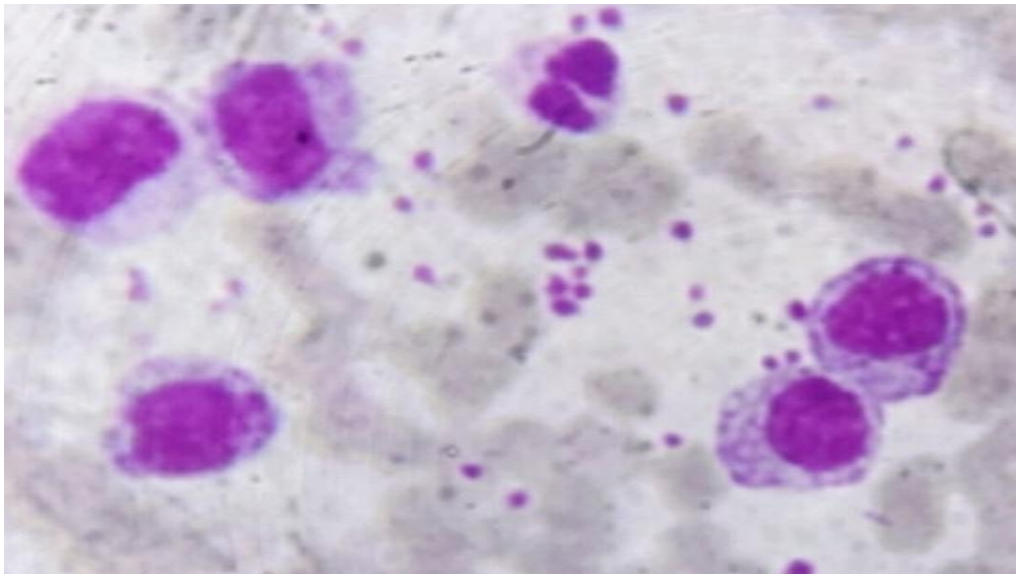

Figure 3: BMA of AML,oil immersion, Giemsa

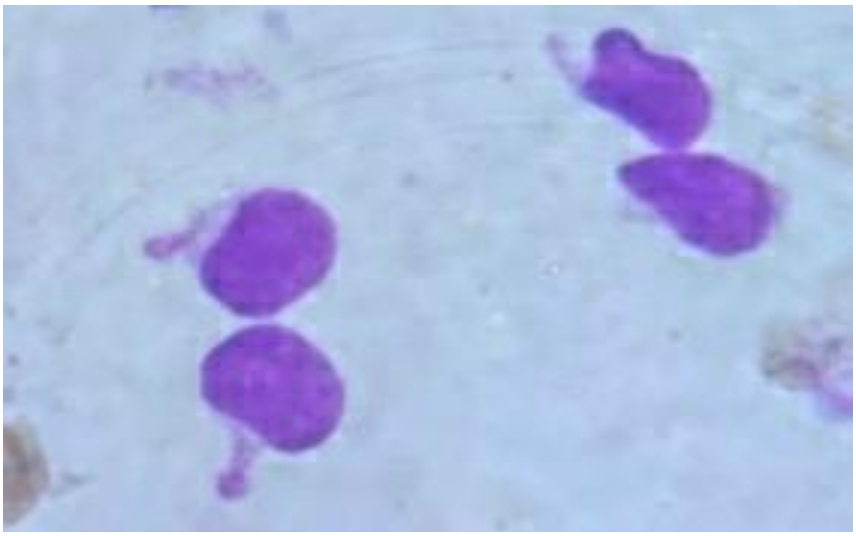

Figure 4 : BMA showing hand mirror cells in acute luekemia,oil immersion, Giemsa

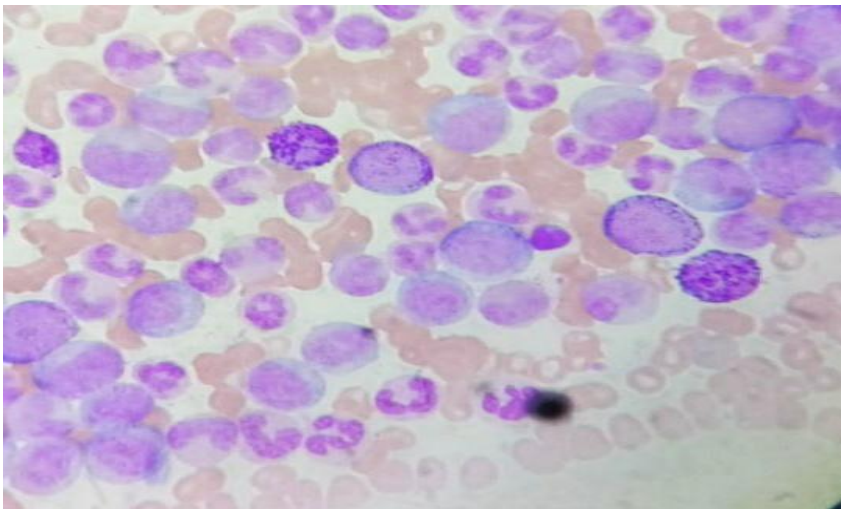

Figure 5: BMA of CML, HPF, Giemsa.

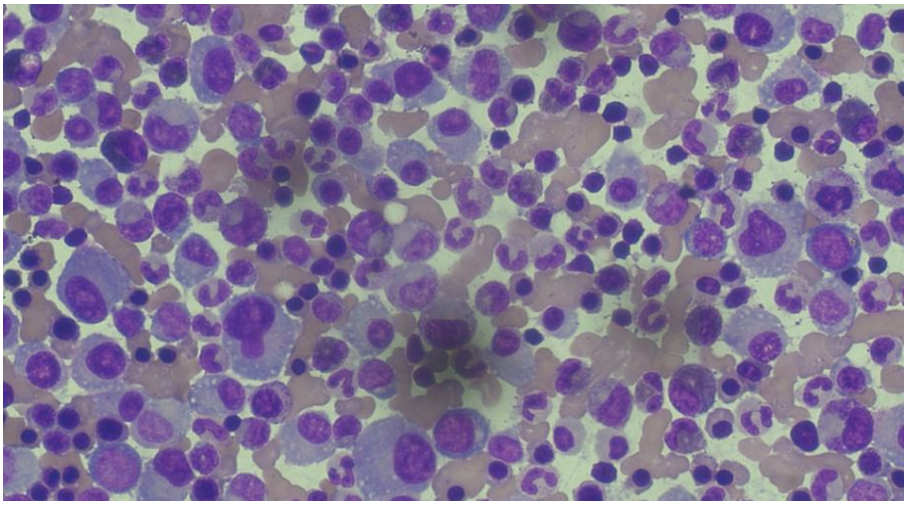

Figure 6: BMA of Multiple myeloma, LPF, Giemsa

IV. Discussion

The hematological disorders exhibit a wide spectrum of diseases both in children and adults. The bone marrow is the principal site of hematopoiesis whose main primary function is to provide mature hematopoietic cells for circulating blood in a steady state as well as to respond to increased physiological or pathological demands. Bone marrow aspiration(BMA) is a cytologic preparation of bone marrow cells obtained by aspiration of marrow and a smear of the cells. BMA plays a very important role both in determining the cause of a disease as well as reaching a definitive final diagnosis. It is used to diagnose, confirm, and/or stage hematologic malignancies. It also helps to evaluate cytopenias, thrombocytosis, leukocytosis, anemias, and iron status. BMA is a relatively safe procedure which is performed routinely in medical practice useful in anaesthesia with minimal morbidity. Rarely infection, excessive bleeding or embolism has been reported after bone marrow biopsy. To add to that, Bone marrow trephine biopsy helps supplementing aspiration in arriving at an etiological diagnosis. Many studies have concluded that BMA will yield diagnostic result in majority of cases.[10,11] In our study too, we could diagnose many cases on BMA alone.

In the present study, the data obtained from among the 556 patients were analyzed to ascertain the relative frequency of different hematological disorders. This study like other studies have also shown that BMA cytology can be carried out in all age groups. The age range (2 years to 82 years) as well as the sex ratio (1:1.02) of subjects undergoing BMA evaluation is similar to that reported in other studies (Pudasaini et al., 2012; Gayathri and Rao, 2011; Ahmed et al., 2011).

In our present study, the age group of 0-30 years showed 271 cases constituting almost 49% of all the cases with the age-group 21-30(20.32%) having the highest number of cases. This is similar to a study done by Niazi et al in which the majority of the patients were from the age group 1- 30 years (Niazi and Raziq, 2004)

Besides, it was also found that nutritional anemia was the most common non- malignant hematological disorder of bone marrow of which megaloblastic anemia (46.58%) occupies maximum number of cases which

was similar to a study by Rahim et al.[2] Other similar studies show that the frequency of nutritional anemia varies from as low as 24% to as high as 68%. [11,12]In our study, megaloblastic anemia(46.58%), dimorphic anemia(12.95%) and iron deficiency anemia(10.97%) accounts for 392 out of the 556 cases close to 70%. The increasing incidence of these anemias reflects the higher prevalence of nutritional deficiency in our country. Furthermore, the occurence of dimorphic anemia in addition to isolated or single nutrient deficiency also strengthen the above point. This finding is similar to that reported by Egesie et al (2009).

The commonest hematological malignancy noted was AML (6.29%) similar to other studies such as Rahim et al.[2]This was followed by aplastic anaemia (5.39%) and ALL (3.95%). Other series have also shown that acute leukemia is the commonest hematological malignancy and AML is more common than ALL (Egesie et al., 2009; Kibria et al., 2010; Gayathri and Rao, 2011; Jha et al., 2008). Leukemias can present with peripheral pancytopenias also. Other malignancies in this study were CML(2.70%), multiple myeloma (1.98%),Metastasis(0.72%), MPN(0.36%) and MDS (0.18%). Other series showed the incidence of multiple myeloma ranging from 0.94% to 4.1% (Kibria et al., 2010; Gayathri and Rao, 2011; Jha et al., 2008; Laishram et al., 2008) and MDS ranging from 2% to 7.9% (Kibria et al., 2010; Gayathri and Rao, 2011; Jha et al., 2008; Khodke et al., 2001).

Thus, the above facts suggest that BMA is an important diagnostic tool. However, in few cases of suspected hematological diseases, no pathology was found on examination of the bone marrow aspirate. Some non-hematological conditions may present with hematological manifestations, thus suggesting some limitations of this procedure.

V. Conclusion

Bone marrow aspiration proves to be a very potent investigation to confirm the diagnosis of suspected hematogical disorders.It also remains a veritable tool in the diagnosis and management of both hematogical as well as non-hematogical disorders. Although invasive and should not be done without clear indication,but once indicated the utility far outnumbered the demerits especially provided the confirmatory nature of the procedure.

The study provides a vivid insight into the causes and pattern of the different hematological disorders and their findings which can go a long way in predicting as well as designing a comprehensive approach to deal with the same especially in a resource poor place like that of ours.

DECLARATIONS
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CONFLICT OF INTEREST: None declared.

ETHICAL APPROVAL: Approved.

Reference

[1]. Pudassini S, Prasad K, Rauniyar S, Shrestha R, Gautam K, Pathak R, et al.Interpretation of bone marrow aspiration in hematological disorder. J Path Nepal 2012; 2:309-12.
[2]. Rahim F, Ahmad I, Islam S, Hussain M, Khattak TA, Bano Q. Spectrum of hematological disorders in children observed in 424 consecutive bone marrow aspirations/biopsies. Pak J Med Sci 2005;21:433-6.
[3]. Bain BJ. Bone marrow aspiration. J Clin Pathol. 2001;54:657-63
[4]. Ryan DH, Felgar RE.Examination of the marrow.In: Lichtman M A, Kipps TJ, et al (eds).Williams haematology 7 th ed. New York, McGraw Hill.2006;3:21-31.
[5]. Lee SH, Erber WN, Porwit A , Tomonaga M, Peterson LC, International Council for Standardization In Haematology. ICSH guidelines for tertiary care hospital in Nepal-11 years study.NMCJ. 2012 Sep;14(3):187-92.
[6]. Bates I. Dacie and Lewis Practical Haematology. In: Mitchell Lewis, Barbara Bain, Imelda Bates, editors. Bone marrow biopsy. 10th ed. Philadelphia: Churchill Livingstone; 2011. p. 115-30.
[7]. Young NS,Abkowitz JL, Luzzatto L. New insights into the pathophysiology of acquired cytopenias. Hematology Am Soc Hematol Educ Program 2000:18-38.
[8]. Hungria VTM, Chiattone C, Pavlovsky M, Abenoza LM, Agreda GP, Armenta J , et al. Epidemiology of Haematologicac Malignancies in Real-World Settings: Findings from the Haemsato-oncology Latin America Observational Registry Study. J Glob Onco.,2019; 5:1-19
[9]. Goyal S,Singh UR,Rusia U.Comparitive Evaluation of Bone Marrow Aspirate with Trephine Biopsy in Hematological Disorders And Determination of Optimum Trephine Length in Lymphoma Infiltration .Mediterr J Hematol Infect Dis .,2014;6(1):e2014002.
[10]. Onal IK, Sümer H, Tufan A, ShorbagiA. Bone marrow embolismafter marrow aspiration and biopsy. Am J Hematol 2005;78:158.
[11]. Mussarat N, Raziq F. The incidence of underlying pathology in pancytopenia. An experience of 89 cases. J Postgr Med Inst 2004; 18; 76-9
[12]. Ng SC, Kuperan P, Chan KS, Bosco J, Chan GL. Megaloblasticanaemia-a review from University Hospital, Kuala Lumpur. Ann Acad Med Singapore 1988;17:261-6.

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