Original Articles

Bone Marrow Aspiration - One year study in tertiary care hospital at Rajkot

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ABSTRACT

INTRODUCTION : Bone marrow aspiration (BMA) is crucial in evaluation, diagnosis, and management of anemia and other hematological disorders, especially in situations where diagnosis remains cryptic after detailed clinical history, physical examination and peripheral blood analysis. This is relatively safe and simple procedure.

AIMS AND OBJECTIVES : The aim of this study is to know prevalence of various hematological disorders and to compare findings of peripheral smear with diagnosis given on bone marrow aspiration.

MATERIALS AND METHODS : Bone marrow examination of 68 cases of suspected hematological disorders was carried out. Bone marrow aspiration was done under aseptic conditions. Slides were stained with Field's stain and where needed Leishman's stain was also done.

RESULT : A total of 68 cases were included in this study. The age range of cases was from 11months to 80 years. Males were 29 (43%) and Females were 39 (57%). In our study pancytopenia was most common indication followed by anemia, thrombocytopenia &suspected malignancy. Megaloblastic anemia was most common finding on bone marrow aspiration in this study.

CONCLUSION : Bone marrow aspiration is relatively simple, safe, and cheap, mildly invasive technique which can diagnose many hematological and non-hematologic diseases that can be confirmed by more advanced investigations.

INTRODUCTION

Bone marrow examination is useful in the diagnosis of both hematological and non-hematological disorders. The two most important techniques used for the diagnosis of hematological disorders are bone marrow aspiration and trephine biopsy. Bone marrow aspiration is an invasive procedure where bone marrow is obtained through a needle aspiration for diagnostic evaluations especially cytology and stem cell harvest [1][2][3].

Bone marrow examination was first done by Mosler in 1876 using a regular wood drill to aspirate bone marrow particles from a patient with leukemia[1].

Bone marrow aspiration specimens are useful in further diagnostic assays including cytochemical/special stainings, immunophenotyping, microbiologic tests, cytogenetic analysis and molecular studies [1][2][3].

It may be useful in establishing the diagnosis of storage diseases and metastatic non-haemopoietic malignancies or when a leucoerythroblastic peripheral blood picture is present [4].Deviations from the normal may be qualitative with abnormal cellular morphology or quantitative with aplasia, hypoplasia or hyperplasia [5].

This study reports on age and sex distribution, the spectrum of common indications and diagnosis of bone-marrow aspiration.

MATERIALS AND METHODS

This was a study of one year (October 2018-September 2019) conducted in the Central Clinical Laboratory, Department of Pathology ,P.D.U. Government Medical College & Hospital, Rajkot. Posterior superior iliac crest was the site of choice for Bone marrow aspiration in most of the patients and sternum in case of obese patients. Records regarding the patient detailed information, consent, clinical history, physical examination, clinical indication for the procedure and all laboratory tests findings including peripheral smear reports were recorded.

The Bone marrow aspiration material was collected and smears were prepared by wedge-spread method and

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stained with Field's stain & Leishman's stain. Wherever needed, special stains such as Myeloperoxidase stain, Periodic Acid–Schiff stain and Pearl's stain were used. All slides were examined by the expert pathologist and the data were manually collected and subsequently analyzed.

Age wise distribution of cases was done by making group of 10 years. Distribution showed that 21-30 years age group had maximum number of cases undergoing bone marrow aspiration. Out of total bone marrow aspiration cases Males were 29 (43%) and Females were 39 (57%).Male: Female ratio is 1:1.3 in this study.

OBSERVATION AND ANALYSIS

Table 1 : Age wise distribution of Bone Marrow Aspiration cases.

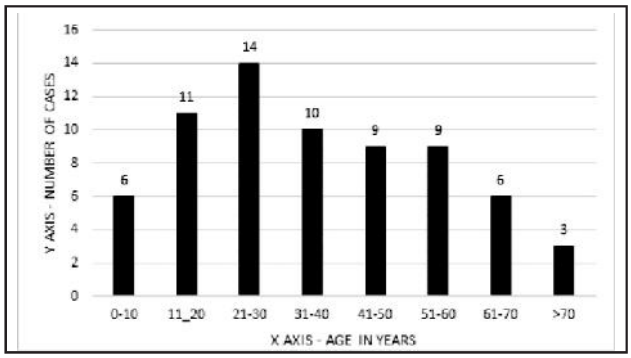
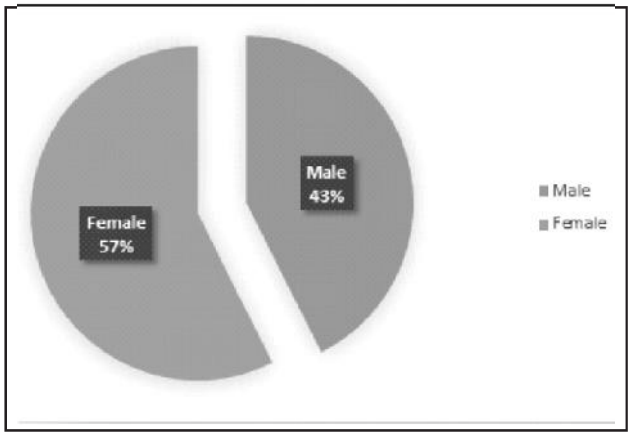


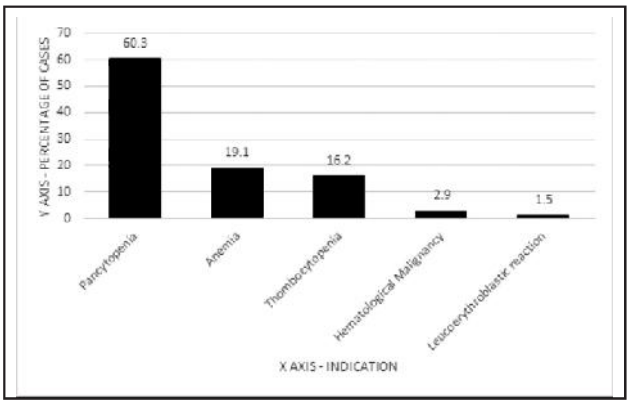
Table 2 : Sex wise distribution of Bone Marrow Aspiration cases.



The most frequent Indication for BMA was pancytopenia 41 cases (60.3%) followed by anemia13 cases (19.1%), thrombocytopenia 11 cases (16.2%), malignancy 2 cases (2.9%) and leukoerythroblastic reaction 1 case (1.5%).

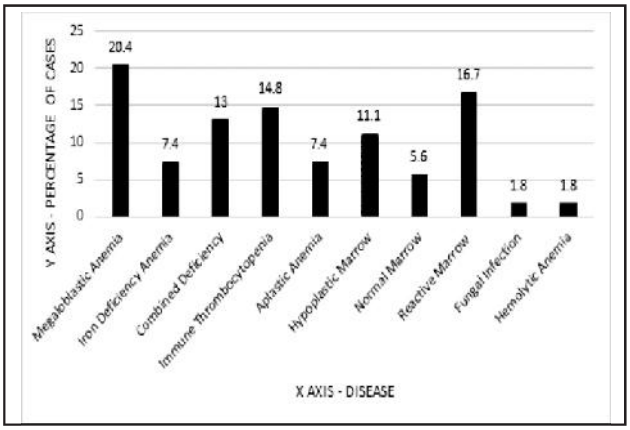
The most common marrow diagnosis was Megaloblastic anemia 11 cases (20.4%). Overall, 09 cases(16.7%) were having reactive marrow, 08 cases(14.8%) of Immune

Table 3 Indications of Bone Marrow Aspiration



thrombocytopenia, 07 cases (13%) of combined deficiency ,06 cases (11.1%) of hypoplastic marrow ,04 cases(7.4%)of aplastic anemia & iron deficiency anemia, 03 cases (5.6%) of normal marrow and 01 case (1.8%) of

Table 4 : Spectrum of Non Malignant Hematological Conditions



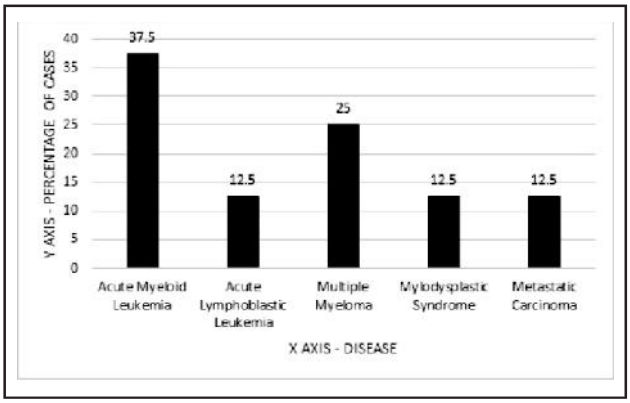
fungal infection and hemolytic anemia were found.

The most common marrow diagnosis of malignant hematological condition was acute myeloid leukemia 03 cases (37.5%). Overall, 02 cases (25%) of multiple myeloma and 01 case (12.5%) of acute lymphoblastic leukemia, myelodysplastic syndrome & metastatic carcinoma each were found.

DISCUSSION

The bone marrow is one of the body's largest organs, constituting 4.5% of the total body weight and weighs 3375 g in an average 75 kg individual[6].It is the principal site of hematopoiesis. BMA is a cytologic preparation of bone marrow cells obtained by aspiration of marrow and a smear of the cells. It is used to diagnose, confirm, and/or

Table 5 : Spectrum of Malignant Hematological Conditions



stage hematologic malignancies. It helps to evaluate cytopenias, thrombocytosis, leukocytosis, anemia, and iron status. It is also a diagnostic tool in non-hematological disorders such as storage disorders and systemic infections.

Most of the aspirate specimens were taken from the posterior superior iliac spine. The sternum was the last choice due to the possible fatal risk of damage to the great vessels during sternal puncture[7,8].In our study 66 Bone marrow aspiration (97%)were taken from posterior superior iliac spine and 2 (3%) were from sternum.

Examination of the bone marrow is one of the most important tool in diagnosing hematological disorders. The age range of cases was from 11 months to 80 years with male to female ratio of 1: 1.3. Most common age group was 21-30 year. In a study done by Niazi and Raziq [9] in 2004 at Pakistan, the majority of the patients were from the age group 1 to 30 years.

Total 68 bone marrow aspiration cases were included in this study out of which 6 were diluted bone marrow. The most frequent indication for bone marrow aspiration was pancytopenia followed by anemia and thrombocytopenia. Similarly by Pudasaini et al. [10] in 2012 at Nepal and Bashawri [11] in 2002 at Saudi Arabia showed pancytopenia as most common indication, but in contrast studies Damulak and Damen [12] in 2012 at Nigeria and Tripathy and Dudani [13] in 2013 in India reported anemia as the most common indicationfor BMA cytology in their studies.

In our study, the most frequent indication for bone marrow aspiration was pancytopenia 41 cases (60.3%) out of which 1 was diluted. Megaloblastic anemia were most common pathological findings09 cases (22.5%), which is comparable to other studies. In a study done by Gayathri and Rao [14] in 2011 at India, megaloblastic anemia was the most common cause of pancytopenia and was the most common finding in BMA. Others 06 cases (15%) of hypoplastic marrow, 5 cases (12.5%) were having reactive marrow, 04 cases (10%) of aplastic anemia, combined deficiency and iron deficiency anemia each, 02 cases (5%) of acute myeloid leukemia, multiple myeloma each and 01 case (2.5%) of acute lymphoblastic leukemia, myelodysplastic syndrome ,normal marrow and fungal infection each were found.

Anemia was second most common indication of bone marrow with13 cases (19.1%) in our study out of which 3 were diluted. Most common cause of anemia was combined deficiency 3 cases (30%) same as reactive marrow(30%) followed by megaloblastic anemia 2 cases (20%) followed by hemolytic anemia and normal marrow each 1 case(10%).However, in a study done by Ahmed et al[15]in 2011 at Ravalpindi, 23.8% of cases were diagnosed as iron deficiency anemia. Although the most common anemia in our country is due to iron deficiency, there is no need of BMA for diagnosis and management. Hence, the prevalence of dimorphic and pure megaloblastic anemia is a higher side in the study. Thus, bone marrow examination could be used effectively in most cases to determine the cause of anemia.

Thrombocytopenia was third most common indication of bone marrow aspiration with 11 cases (16.2%) out of which 1 was diluted. Most common cause of thrombocytopenia was immune thrombocytopenia 8 cases (80%) followed by normal & reactive marrow 01 case (10%) each.ITP is usually chronic in adults[16]in 2002 at England and the probability of durable remission is 20-40% [17]in 2006 at Netherlands.

Acute myeloid leukemias were most common malignant disorder seen in our study accounting for 4.1%. Same as Acute myeloid leukemias were the common cause of haematological malignancies in a study conducted by Atla BL et al. [18] in 2015 at India. Multiple myeloma was second most common malignancy accounting for 2.9% .Our study was comparable to that of Ranabhat S et al.[19]in 2017 at Nepal in their study multiple myeloma constituting 13.3% . Acute lymphoblastic leukemia was third common malignancy (1.4%). Same as Egesie et al. [20] in 2009 at Niger, Kibria et al. [21] in 2010 at Faridpur and Gayathri and Rao [10] in 2011 at India had reported acute myeloid leukemia more common than ALL.

In our study, metastatic deposits were seen in 1.4% of cases. Adewoyin AS et al [22] in 2014 at India in their study had seen marrow carcinomatosis in 7.9% cases. D Ghartimagar et al [23] in 2012 at Nepal in their study showed metastasis in 6%, normal marrow findings were

seen in 6.8% cases. Normal marrow study was seen in 3.8% cases in the study of Atla et al [18] in 2015 at India while 10.5% cases had a normal marrow in study by Pudasaini et al. [9] in 2012 at Nepal.

CONCLUSION

Bone marrow examination is an important and easy investigation to arrive at the confirmatory diagnosis of hematological disorders. The procedure remains a veritable tool in the diagnosis and management of a wide range of hematological and some non-hematological diseases included as the cause of pancytopenia.

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