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Study of Role of Red cell indices in distinction between macrocytosis of aplastic and megaloblastic anemia in Patient, attending in SKMCH, Muzaffarpur.

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Abstract

Objective-Megaloblastic anemia and aplastic anemia are the major cause of pancytopenia. Due to the presence of macrocytes, in both magaloblastic anemia and aplastic anemia, peripheral blood smear examination cause difficulty in differentiation between the two in the absence of macro - ovalocytes and hypersegmented neutrophils.The present study measures the role of red cell indices in differentiation between macrocytosis of aplastic anemia and megaloblastic anemia.**Material and Method**-Hemogram of a total 22 Patients each of biopsy proven megaloblastic anemia and aplastic anemia were included in the study.**Result-** It was observed that MCV was greater than 94 fl in 09 Patients of aplastic anemia (mean MCV 107.2 fl), and 22Patients of megaloblastic anemia (mean MCV 111.25 fl).Hb, MCV and MCHC were comparable in the two groups. However, mean RDW in megaloblastic anemia (mean 87.2 fl) was significantly higher than those in aplastic anemia (mean 71.6 fl). **Conclusion-**Red cell distribution width measures to differentiate between the megaloblastic anemia and aplastic anemia.

Key words: Mean corpuscular volume (MCV), Macrocytes, Red cell distribution width (RDW)

Introduction

Aplastic anemia often presents with macrocytosis and pancytopenia. Megaloblastic anemia may also present with macrocytic anemia and pancytopenia.Hypersegmentated polymorphs and fully hemoglobinated macro-ovalocytes in megaloblastic anemiamay shows inPeripheral smears[1]. These features if present can easily differentiate between pancytopenia of aplastic anemia and megaloblastic anemia. However, some patients with megaloblastic anemia may present without macroovalocytes and hyper-segmented polymorphs. In such cases, one resorts to bone marrow

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biopsy examination to differentiate between the two. As this procedure is painful for the patient, this study makes an attempt to eliminate the need of bone marrow evaluation, by using the para-meters of red cell indices to differentiate between the two anemias.

Material and Method

The Present study was conducted in the Department of pathology, Sri Krishna Medical College, muzaffarpur, during the period of December 2020 to December 2022.In our study a total of 22 patients were included in the study. We examined all the samples of patients which were clinically and bone marrow biopsy diagnosed cases of megaloblastic and aplastic anemia. Complete blood counts including Mean corpuscular volume (MCV), Mean cell hemoglobin (MCH), Mean cell hemoglobin concentration (MCHC) and Red cell distribution width (RDW), calculated as standard deviation (RDW - SD) were obtained in all cases and were studied by the automated hematology analyzer sysmex xn 350 with standard calibration.

The patient's Hemoglobin (Hb), MCV, MCH, MCHC and RDW - SD, were studied and the values in both the anemias were compared and the results were analyzed. The cut - off limits for macrocytosis was taken as > 94 fl, and the normal values of RDW - SD, was taken as 38 -45 fl.

Result

It was observed that in megaloblastic anemia, the mean MCV of the Patients was 111.25 fl,standard deviation (S.D.) calculated is 12.6 % and the mean of RDW - SD was 87.2 fl, the S.D. is 20.8% fl. In aplastic anemia the mean MCV is 107.2 fl. the S.D is 8.62%. Similarly the mean of RDW – SD is 71.6 fl with the S.D of 9.23%.

The values of MCV, MCH and MCHC were comparable. But, the RDW - SD was significantly higher in megaloblastic anemia in contrast to aplastic anemia, the clinico - hematological profile of the patients diagnosed as megaloblastic anemia and aplastic anemia are given in Table-1

Discussion

MCV and reticulocyte count were the two traditional principal criteria for the initial classification of anemic disorders. Due to newer advanced technology routine complete blood cells count improve the precision speed of Sample testing and also the analysis of large number of single - cell measurements.The distribution of red cell volume is measured as coefficient of variation (CV) or standard deviation (SD) and reported as red cell distribution width (RDW)[5,4]. RDW shows red blood cell sizes within a sample. RDW has been proposed to be useful in early classification of anemia’s because it becomes abnormal earlier in nutritional deficiency anemia’s than any of the other red cells parameters, especially in cases of iron deficiency anemiaThus, the RDW may be useful when characterizing microcytic anemia, particularly distinguishing between iron deficiency anemia (high RDW, normal to low MCV) and uncomplicated heterozygous thalassemia (normal RDW, low MCV)' In addition to providing information about the etiology of anemia, the RDW is useful in identifying red cell fragmentation, agglutination, or

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dimorphic cell population[11,8]. However,it is not confirmatoryfor the diagnosis of anemia inmeasurement of RDW,other methods are required to confirm the diagnosis.

The average volume of the red blood cell is a useful red cell index that is used in classification of anemia. The MCV ismeasured in automatedhematology analyzer, but may also be calculated from the erythrocyte count and the hematocrit value. Classification of anemia's by MCV alone was < 90 % sensitive in patients with chronic disease, chronic liver disease, sickle cell anemia, heterozygous thalassemia, and iron, folate or mixed nutritional deficiency[1,2]. Both MCV and RDW can accurately predict normal subjects and patients with different anemias.

In our study megaloblastic anemia, both MCV & RDW were high as same as a study done by Bessman J et al & Lewis et al. but, in aplastic anemia without any history of blood transfusion, MCV was found to be high with normal RDW values. In megaloblastic anemia RDW - SD values were higher than the aplastic anemia[2].This differences between RDW values with our study was due to that previous study includes all cases of aplastic anemia.MCV was higher in megaloblastic anemia (mean of 111.25 Fl) in contrast to aplastic anemia (mean of 107.2 fl)[6].

Conclusion-RDW - SD values > 92 fl, presents as megaloblastic anemia and RDW between 55 - 92 fl, may be seen in both conditions. In the latter situation the bone marrow biopsy may be performed to differentiate between the two conditions.

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Clinico- hematological Profile	Megaloblastic Anemia	Aplastic Anemia
Total no. of patients	22	22
MCV>94 fl	22	9
Age(years)	15 - 52	8 - 58
Hb (gm/dl)	4.2 – 10.1	2.9 -7.5
MCV (fl)	111.25 ± 12.6	107.2 ± 8.62
MCH(pg)	31. 6 ± 8.2	31.9 ± 6.2
MCHC(g/dl)	27.2 ± 5.5	29.8 ± 4.8
RDW-SD (fl)	87.2 ± 20.8	71.6 ± 9.23

Table -1 Clinico- hematological profile and red cell indices