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Hematological Parameters of Patients Suffering from Megaloblastic anemia and Aplastic anemia, Attending in Tertiary Care Hospital at Betiah, West Champaran, Bihar

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Abstract
Objective: *The present study was undertaken to evaluate the role of red cell indices in differentiation between macrocytosis of aplastic anemia and megaloblastic anemia.*
Materials and Methods: *A total of 36 patients each of bone marrow biopsy proven, megaloblastic anemia and aplastic anemia were included in the study. From all the patients of both the group's CBC were done by fully automated, five part CBC machine supplied by Mindray. All the parameter was noted and comparative study were evaluated.*
Results: *It was observed that MCV was greater than 97 fl. in 14 cases of aplastic anemia (Mean MCV 106.8 fl) and 22 cases of megaloblastic anemia (mean MCV 111.82 fl). Hb, MCV, and MCHC were comparable in the two groups. However mean RDW (Red cell width) in megaloblastic anemia (mean 86.8 fl) was significantly higher than those in aplastic anemia (mean 70.4 fl). The difference in RDW of patients with megaloblastic anemia and aplastic anemia was statistically significant.*
Conclusion: *RDW can be of help to differentiate between the megaloblastic anemia and aplastic anemia.*
Keywords: *Mean corpuscular volume (MCV), Macrocytes, Red cell distribution width (RDW), MCHC, HB.*

Introduction

Megaloblastic anemia and aplastic anemia are important causes of pancytopenia in India. Since both may have presence of macrocytes, peripheral smear examination alone may pose a difficulty in distinction between the two in the absence of macro-ovalocytes and hyper segmented neutrophils.

Aplastic anemia often presents with macrocytosis and pancytopenia. Megaloblastic anemia may also present with macrocytic anemia and pancytopenia. In addition the peripheral smears may show hypersegmentated polymorphs and fully hemoglobinated macro-ovalocytes in megaloblastic anemias. 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 hypersegmented polymorphs. In such cases, one resorts to bone marrow 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 parameters of red cell indices to differentiate between the two anemia.

Materials and Methods

In the present study, we examined blood samples of 36 patients of clinically and bone marrow biopsy diagnosed cases of megaloblastic and aplastic anemias, attending the Department of pathology (Hematology), Government Medical College, Betiah, West Champaran, Bihar, during the periods of January 2016 to September 2018. Complete blood counts including Mean corpuscular volume (MCV), Mean corpuscular hemoglobin (MCH), Mean corpuscular 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 haematology analyzer, mindray five part, 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 analysed. The cut off limits for macrocytosis was taken as > 97 fl, and the normal values of RDW- SD, was taken as 38-45 fl.

Results

It is seen that in megaloblastic anemia, the mean MCV of the cases studied is 111.82 fl, and standard deviation (S.D.) calculated is 14.2%. The acceptable range under the normal curve is taken as Mean +/- 2 S.D that is varying between 83.21 to 140.72 fl. Similarly the mean of RDW- SD in megaloblastic anemia is 86.8 fl, the S.D. is 0.5% and the range is between 45.9 to 127.6 fl. The maximum to minimum range of RDW-SD varies between 61 to 140 fl.

In aplastic anemia the mean MCV is 106.8 fl and the S.D. is 8.42% and the range is between 107.1 +/- 16.80 fl, (90.2 to 123.1 fl). Similarly the mean of RDW- SD is 70.4 fl with the S.D. of 10.1 %, and the range varying between 70.5 +/- 20.2 fl, that is between 50.01 to 91.8 fl. The maximum to minimum range of RDW-SD varies between 55 to 86.2 fl.

The values of MCV, MCH and MCHC were comparable. But, the RDW-SD was significantly higher in megaloblastic anemia in contrast to aplastic anemia.

Table -1 Shows Hematological parameters of patients

Parameters	Megaloblastic anemia	Aplastic anemia
Total no. Of patients	36	36
(MCV > 97fl)	22 (61.11) patients	14 patients (38.88%)
Age (yrs)	14-46	7-49
M : F ratio	2 : 1	1.5 : 1
Hb (gm/dl)	4.4 – 9.6	2.5- 7.5
H/O Blood Transfusion (last 90 days)	None	None

Table-2 Shows Comparison of Red cell Indices

Parameters	Megaloblastic anemia	Aplastic anemia
Total no. Of patients.	36	36
MCV (fl)	111.8 +/- 14.2	106.8 +/- 8.42
MCH (pg)	31.3 +/- 9.6	31.8 +/- 4
MCHC (gm/dl)	27.3 +/- 5.2	28.6 +/- 4.5
RDW-SD (fl)	86.8 +/- 0.5	70.4 +/- 10.1

Discussion

MCV and reticulocyte count were the two traditional principal criteria for the initial classification of anemic disorders. The change from chamber counts to flow cytometry for routine blood counts has brought not only improved speed and precision, but also new measurements permitted by 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). RDW measurement reflects the range of

red cell sizes measured within a sample. RDW has been proposed to be useful in early classification of anemias because it becomes abnormal earlier in nutritional deficiency anemias than any of the other red cells parameters, especially in cases of iron deficiency anemia. Thus, 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 aetiology of anemia, the RDW is useful in identifying red cell fragmentation, agglutination, or dimorphic cell population. However, the reliability of using RDW as a sole method for diagnosis of anemia is uncertain, and 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 is usually measured directly with automated haematology instruments, but may also be calculated from the erythrocyte count and the haematocrit. Classification of anemias by MCV alone was <90% sensitive in patients with chronic disease, chronic liver disease, sickle cell anemia, hetarozygous thalassemia, and iron, folate or mixed nutritional deficiency. Both MCV and RDW can accurately predict normal subjects and patients with different anemias.

In a study by Bessman J et al and Lewis et al it was seen that in megaloblastic anemia, both MCV and RDW were high as found in this study. Whereas, in aplastic anemia with no history of blood transfusion, MCV was found to be high but had normal RDW values. In contrast, RDW-SD was found to be significantly higher in megaloblastic anemia than in aplastic anemia. This distinction between RDW values with our study could be because the previous study had selected all cases of aplastic anemia, whereas in this study only cases of macrocytosis with aplastic anemia were selected. Incidentally although MCV was higher in megaloblastic anemia (mean of 111.82 fl) in contrast to aplastic anemia (mean of 106.8 fl) it was not statistically significant.

Conclusion

It is thus Concluded that, in a case of pancytopenia with MCV of >97 fl, with absence of macroovalocytes and macropolycyte where it may be difficult to differentiate megaloblastic anemia from non-transfused aplastic anemia, RDW may be helpful. A RDW-SD >92 fl, suggests presence of megaloblastic anemia, but a RDW between 55-92 fl, may be seen in both the conditions. In the latter situation the bone marrow biopsy may be performed to differentiate between the two conditions.

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