VOLUME-7, ISSUE-8, AUGUST-2018 • PRINT ISSN No 2277 - 8160

Original Research Paper

Pathology

PROGRESSIVE STUDY OF DIMORPHIC ANAEMIA IN ADULTS WITH REFERENCE TO BASIC PATHOLOGY AT RIMS RAIPUR CHATTISGARH

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ABSTRACT Objective of this study was to investigate the basic cause of dimorphic anemia in adult patients using hematological parameters, bone marrow iron stores, serum vitamin B12 and folate assays. Hematological parameters and bone marrow, serum vitamin B12 and folate assays of 62 patients with dimorphic anemia were studied to evaluate the basic etiology in dimorphic anemia.The mean MCV was 95.01±13.14fl and MCV was normal in 56.45% cases. BM examination showed megaloblastic maturation in 32.36%, megaloblastic with micronormoblastic maturation in 64.52% cases. BM iron stores were deficient in 32.26% cases. 43.55% cases had only folic acid deficiency, 19.35% cases had only B12 deficiency and 27.42% cases had both B12 and folate deficiency. Combined iron and vitamin deficiencies in 25.8% cases. The mean MCV, MCH, MCHC and RDW were significantly high in combined deficiencies.The common basic cause for dimorphic anemia was folate deficiency. MCV is unreliable as a screening parameter for anemia with vitaminB12 or folate deficiencies.

KEYWORDS : Anemia, Dimorphic, Folate, Megaloblastic, Myelodysplasia, Vitamin B12

INTRODUCTION

Globally, anemia affects 1.62 billion people, which corresponds to 24.8% of the population. Dimorphic anemia has a complex pathogenesis with involvement of more than one deficiency state, usually due to deficiency of both iron and vitamin B12 or folic acid. This condition may be reflected by increased RDW in the presence of normal MCV, with dimorphic blood picture showing two RBC populations, that is combination microcytic hypochromic and macrocytic normochromic cells. Myelodysplasia may be an underlying pathology in older age group, as the dimorphic anemia is characteristic of sideroblastic anemia. Concomitant vitamin B12 or folate deficiency with iron deficiency results in masked megaloblastosis, where the vitamin deficiencies are not associated with classic findings of megaloblastic anemia.If treated with iron alone megaloblatosis will be unmasked. Our study signifies the importance of early diagnosis of specific vitamin deficiencies and thereby preventing the further life threatening consequences.

MATERIAL AND METHOD

The study included 200 adult patients with mean corpuscular volume >70fl, RDW >15%, RBC histogram with double peaks and peripheral blood smear showing dimorphic blood picture. Pregnant females, cases with increased reticulocyte count and who had received blood transfusions and specific therapy were excluded. The basic etiology in dimorphic anemia is evaluated using bone marrow iron stores, serum vitamin B12 and folate assays and compared with hematological parameters. The study had been approved by Institutional ethics committee. Bone marrow (BM) aspiration was performed on these patients at the posterior superior iliac spine. Smears were prepared, airdried and stained with Giemsa and perls' stain. Giemsa stained smears were looked for cellularity, erythroid hyperplasia, maturation and dysplasia of erythroid, myeloid and megakaryocytic series. Perls' stained smears were looked for iron stores and graded according to Gale's method. Blood sample was collected in plain vacutainers, serum was separated immediately. Serum levels of folic acid and vitamin B12 had been carried out using proper controls. Vitamin B12 deficiency was defined as serum levels of B12 ≤ 211 pg/ml. Folate deficiency was defined as serum levels of folic acid ≤ 5.3 ng/ml. Statistical Analysis Percentage of each cause was calculated. The mean and standard deviation were used for statistical analysis. ANOVA test was used to test the variation of mean of hematological parameters in various groups and its significance. $P < 0.05$ was considered statistically significant.

RESULT

The age group of our cases ranged from 20 to 75 years with mean age of 40.95±17.61 years. Majority of patients 23(37.1%) belonged to second decade, followed by fifth decade constituting 14(22.58%) cases. Male: Female ratio was 1.1:1. 33(53.2%) were male and 29(46.8%) were female. The commonest presenting complaint was fatiguability in 37 (59.68%) cases, followed by fever in 31(50 %)c cases, 15 (24.19%) cases presented with respiratory distress, 6(9.68%) patients had associated bleeding manifestations like epistaxis and bleeding per rectum. Other symptoms like headache, chest pain, pain abdomen, joint pain and diarrhea were seen in 18 (29%) cases. Pallor was present in all patients. Icterus was seen in 11.29% (7/62). Hepatomegaly and splenomegaly was seen in 16.13% and 12.9% of patients respectively. The hemoglobin concentration ranged from 1.49 gm/dl to 10.5 gm/dl with the mean of 5.74±2.43gm/dl. Severe anemia with Hb < 8 gm/dl was seen in 49 (79.03%) cases, moderate (8-10 gm/dl) in 12(19.35%) cases and mild(> 10 gm/dl) in only one (1.61%).

DISCUSSION

Nutritional deficiencies is the most common cause of anemia, in country like India. Good proportion of cases show combined deficiency of iron, vitamin B12 and folic acid, where multiple factors affect the diagnostic parameters, resulting in discordant results of tests like bone marrow morphology, iron stores and iron studies. Iron deficiency anemia is the first common nutritional anemia in our country, followed by megaloblastic anemia. People with low socioeconomic group are the ones who are mainly affected. Majority of cases in this study were in second decade of life. There was no clear male preponderance seen. In this study, the commonest presenting complaint was fatiguability in 59.68% (37/62) followed by fever in 50 % (31/62). The present study showed, only dimorphic anemia in 22(35.5%) cases, anemia with leucopenia in 8(12.91%) cases and thrombocytopenia in 11(17.72%) cases, pancytopenia in 21(33.87%) cases, which was similar to study conducted by Khan S et al. In our study, MCV was < 97fl in 35 (56.45%) patients and high MCV was seen in 27 (43.55%) patients, our finding is consistent with a study where high MCV was seen in 41.7% patients. Concomitant iron deficiency and fragmentation of red cells may result in normal MCV. RDW is useful in differentiating megaloblastic anemia (high MCV with high RDW) and other macrocytic anemia (high MCV and normal RDW). Bone marrow examination showed normocellular marrow in 32% cases and hypercellular marrow in 68% cases, which is similar to the study by Metikurke SH et al where 36.02% cases had normocellular marrow and 57.72% cases had hypercellular marrow. Megaloblastic maturation was seen in 32.36% patients and megaloblastic with micronormoblastic maturation in 64.52% of our patients. Megaloblastic bone marrow is hypercellular, with accumulation of

primitive cells. Megaloblastic anemia may be associated with normoblastic or micronormoblastic maturation.Bone marrow iron stores in uncomplicated megaloblastic anemia are normal or increased. Assessment of iron stores in bone marrow is considered as "Gold standard" test. Megaloblastic anemia with adequate iron stores and low iron stores was present in 65% and 10% respectively, similar to studies by Tahlan et al in 69.1% and 17% cases respectively.DNA synthesis is impaired in Folic acid and vitamin B12 deficiency, resulting in impaired and ineffective erythropoiesis. Vitamin B12 or folate deficiency is associated with elevated homocysteine levels, major risk factor of occlusive vascular diseases. The present study shows isolated folate and vitamin B12 deficiency in 43.5% and 19.3% cases respectively. Combined folate and vitamin B12 deficiencies were seen in 27.42% cases. The present study showed folate deficiency as the major cause of dimorphic anemia. The present study shows isolated folate and vitamin B12 deficiency in 43.5% and 19.3% cases respectively. Combined folate and vitamin B12 deficiencies were seen in 27.42% cases. The present study showed folate deficiency as the major cause of dimorphic anemiaRacial and ethnic factors may influence the normal levels and metabolism of these vitamins. Variation of nutritional deficiencies across the geographical regions is associated with nutritional profile and associated infectious and inflammatory diseases. The laboratory diagnosis of folate deficiency has been more difficult than that of vitamin B12, as serum folate levels are markedly affected by a short period of dietary deprivation and recent alcohol ingestion.Dietary deprivation may be reason for more patients with folate deficiency in our study, as 79.03% patients were severely anemic with severe illness. 50% of patients presented with fever. Iron deficiency masks the expression of vitamin B12 and folate deficiency. If the vitamin deficiency predominates, full morphologic expression of megaloblastic hematopoiesis is seen, but response to vitamin will be incomplete. If iron deficiency predominates, morphologic expression of vitamin deficient state is limited to only myeloid series. Thus, it's very important to know the basic etiology and treat efficiently. In the present study 25.8% of cases showed both iron and vitamin deficiency. When iron therapy is given to the patient with both megaloblastic and iron deficiency anemia, the bone marrow findings of megaloblastic anemia is unmasked and symptoms persist. Other than hematological and neurological manifestations, vitamin B12 and folate deficiencies are less commonly associated with occlusive cardiovascular diseases, osteoporosis and pathological fractures.Megaloblastic anemia develops over a period of time and most of them are well compensated. Urgent blood transfusion or any form of therapy is not indicated before collection of serum samples for vitamin assays. Assays alone determine which vitamin is deficient. Megaloblastic anemia results in life threatening complications if unrecognized and not treated adequately.

CONCLUSION

In our study,the common basic cause for dimorphic anemia was folate deficiency. Majority showed normal MCV even with vitamin B12 & folate deficiency. MCV alone is unreliable as a screening parameter in anemia with vitamin B12 or folate deficiencies, with associated iron deficiency. Concomitant deficiencies of B12 or folate with iron deficiency are not infrequent, constituting 25% of our cases. Its important to establish the correct diagnosis to avoid inappropriate therapy. Serum assays will be appropriate to establish the cause in concomitant deficiencies, as it may result in discordant results in hematological parameters, BM morphology and iron stores. Thus, hematological parameters alone are likely to miss deficient cases.

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