ORIGINAL ARTICLE

Profile of Erythroblastopenia in Childhood

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Abstract

Bone marrows of hospitalized children with anaemia were examined to study the incidence and profile of erythroblastopenia in childhood. Forty children aged between 7 months to 12 years with anaemia, reticulocytopenia and isolated erythroblastopenia on Bone marrow aspiration were evaluated during 2 years duration. Depending on duration of illness and their recovery the disease was categorized into acute, subacute and chronic erythroblastopenia. The disease was found to be associated with PEM and nutritional anaemia (55%), gastroenteritis (12.5%) and respiratory tract infections (12.5%) amongst others.

Key Words

Pure Red Cell Aplasia, Transient Erythroblastopenia of Childhood, Congenital Hypoplastic Anaemia

Introduction

Erythroblastopenia or pure red cell aplasia is a condition in which anaemia develops because of diminished number of erythroblasts in the bone marrow without participation of the granulopopoietic and thrombopoietic system (1). Although first described by Kaznelson in 1922, the entity was reported in children in 1927 by Barr with name of "post infectious erythropathisis (2). Pure red cell aplasia (PRCA) in adults is considered a variant of aplastic anaemia, treated on the same lines and is associated with an underlying disorder like thymoma; whereas erythroblastopenia of childhood can be congenital (Diamond Blackfan Anaemia) requiring steroid or may be transient (TEC). The duration of later may be variable and relatively chronic form is noticed in children attributed to malnutrition, chronic infection and vitamin deficiency (3). Recognition of the entity which is a self limiting illness is very important, because it requires differentiation from hypoplastic type anaemia (PRCA), anaemia of chronic disorders and anaemia secondary to other systemic illness like renal failure and endocrinopathies for proper management. The present study was conducted in children presenting with erythroblastopenia severe enough to require indoor hospital admission.

Material and Methods

A total of 575 bone marrow samples were received over a period of the two years from paediatric ward for evaluation. Of these 40 patient whose bone marrow samples revealed erythroblastopenia with normal myelopoiesis (absolute neutrophil count 2500/cmm and thrombopoiesis (platelet count more than 1.5 lakhs) were included in the study. All the cases with underlying renal, hepatic and endocrinal involvement were excluded. Based on recovery, the cases were classified into three groups i.e. acute - recovery within 3 weeks (8 cases); subacute - recovery within 3 to 8 weeks (11 cases); chronic - where anaemia persisted after 2 months and required treatment on the lines of hypoplastic / aplastic anaemia (21 cases). These patients were monitored daily in the first week, biweekly thereafter by doing peripheral blood counts, reticulocyte count and hemoglobin. These patients were investigated thoroughly including relevant biochemical, radiological and imaging investigations, hormones and hematological parameters. Onset of recovery was taken with reticulocyte count increasing to more than 5% persisting for at least for three consecutive days and resulting in increment of Hb, repeat bone marrow aspiration was performed wherever required.

Results

Erythroblastopenia without an underlying definite causative disease like renal and hepatic or endocrine disorder resulting in anaemia severe enough to require hospital admission accounted for 40 patients (6.9%) of pediatric patients admitted to indoors for anaemia. Maximum number of patients wee between age group of 1 to 4 years (20 patients). The youngest was 7 months old, oldest was 12 years old and included 26 boys and 14 girls. Extreme Pallor without jaundice was seen in all cases. Other presenting symptoms included gastroenteritis (12.5%), nutritional anemia with PEM

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Table I. Distribution of Patients of Various Categories According to Their Clinical Disorders

Clinical diagnosis	Categories						Overall
	Acute		Sub-acute		Chronic		
	Number of cases	% of acute cases	Number of cases	% of sub acute cases	Number of cases	% of chronic cases	% of 40 cases
Nutritional anaemia with PEM	2	25%	7	63.6%	3	61.8%	55
Gastroenteritis	4	50	1	9.1	0	0	12.5
Respiratory tract infection (BPN) with anaemia	1	12.5	2	18.2	2	9.55	12.5
PUO	1	12.5	1	9.5	6	28.6	20
Total	8	100	11	100	21	100	100

Table II. Data Showing Positive Findings in Peripheral Blood Film and Bone Marrow

Haematologic data	Categories					
	Acute		Sub-acute erythroblastopenia		Chronic erythroblastopenia	
	Range	Mean	Range	Mean	Range	Mean
Peripheral Blood examination	N.N		Normocyte to macrocyte		Normocyte to macrocyte	
Hb (in gm%)	3.5-7.5	5.1	2.5-7.5	4.5	1.2-6.7	4
WBC Count (per cmm)	4200-15000	9200	4000-12000	8400	3000-18700	9400
Reticulocyte Count in %	0.1-2.5	0.7	0 to 2.5	0.9	0 to 2.5	1.2
No. of patients with increased HbF (range)	---	–-	2 (6-8%)	---	4 (6-10%)	---
Bone marrow examination M/E ratio	Increased		Increased		Increased	
Erythropoiesis	Decreased		Decreased		Decreased	
Lymphoid cells aggregates	10		3			

(55%). Respiratory tract infections (12.5%), fever (20%) and others. Acute or Transient erythroblastopenia with reticulocytopenia which listed for few days to weeks was noticed in 8/40 patients and all were between 0-4 years of age. Fifty percent of these patients (4/8) had acute gastroenteritis, 2 had PEM and 2 had respiratory tract infections. Hemoglobin values ranged from 3.5 to 7.5gm% with normal white blood cells and platelet counts. Subacute erythroblastopenia was seen in 11 patients (27.5%) where anaemia lasted for 2 months. The mean hemoglobin value was 4.5gm% and reticulocyte count ranged from 0 to 2.5%. Nutritional anaemia with PEM (63.6%), gastroenteritis (9.1%) and respiratory tract infections (18.2%) were seen in association with subacute erythroblastopenia. Chronic erythroblastopenia with a duration of more than two months was seen in 21/40 (52.5%) cases. Most of these patients were in age group of 1-4 years and had nutritional deficiency (61.8%), bronchopneumonia (9.55%) and PUO (28.6%) (*Table I & II*). The hemoglobin ranged from 1.2 to 6.7gm% with normal WBC counts. One of the patients in this group with diagnosis of PEM grade IV with pulmonary tuberculosis and severe anaemia died after 3 months of admission whereas all other patients in acute, subacute

and chronic erythroblastopenia improved. Increased HbF ranging from 6% to 10% was seen in 6 patients (2 of subacute and 4 of chronic erythroblastopenia). Bone marrow examination in all these patients showed increased myeloid erythroid ratio with erythroid hypoplasia. A marked increase in lymphocyte count with high percentage of young lymphoid cells was observed in marrow of 13 patients (10 from acute and 3 from subacute erythroblastopenia) but infection due to any organism was not proved serologically in any case. A seasonal clustering was observed during the months from March to May form two consecutive years. Maximum number of cases (17/40, 42.5%) were recorded during this time. About 90% of patients required blood transfusions varying from one to three transfusions.

Discussion

Anaemia / pallor constitute one of the most common clinical complaints in patients of haematology and vexes both the patients and clinicians. Diminution of erythroblasts (erythroblastopenia) in bone marrow without a significant lowering of myeloid precursors can be cause of unexplained anaemia in children (4). In our study, over a period of two years duration, 40 cases (6.9%) of anaemia were diagnosed to have erythroblastopenia on bone marrow examination (where chronic renal, other causes of anaemia, hepatic or endocrine disorders were excluded).On follow up, nineteen of these patients (19/40) had transient erythroblastopenia (TEC) which lasted for a duration varying from few weeks to two months. The diagnosis was confirmed by spontaneous recovery of the marrow with resolution of anaemia. Transient erythroblastopenia of childhood usually requires no specific treatment except for the blood transfusion. TEC must be distinguished from congenital erythroid hypoplasia (Blackfan Diamond Syndrome) which is usually seen in children less than 1 year of age with frequent congenital anomalies and is not associated with spontaneous recovery (5). Increased red cell fetal hemoglobin along with red cell adenosine deaminase levels and persistence of antigen on red blood cells may be helpful in distinguishing hypoplastic anaemia from TEC.6 However, the red cells of infants and those in recovery phase of TEC may also contain significant amount of fetal hemoglobin (7) as was observed in 6 patients (15%) in our series.In bone marrow along with decrease in erythroid precursors, a marked increase in number of lymphocytes including many immature forms was observed in (10/19) patients. These findings may be mistaken for acute lymphocytic leukemia. These lymphoid cells may be positive for early B cell markers, CD10 and tdt (8). But distinction of ALL from TEC is usually not difficult, owing to the difference in clinical presentation and recovery within one to two months in TEC. Twenty one cases (52.5%) had chronic erythroblastopenia in bone marrow which showed recovery after 2 months. Apart from repeat transfusions, (8) patients were given steroids and one patient died following course of disease. However, most of these patients recovered partially or completely during treatment and are on regular follow up for last one year. These patients are being monitored for subsequent developed of aplastic / hypoplastic anaemia. A seasonal clustering from March to May in two successive years as noted in our series point to some vital agents as causative organism which has also been stressed by various authors Albeit at different times in different geographic areas (9). The infection specifically by human parvovirus B19 has been found to be associated with the disease (10).

Conclusion

Diminution of erythroblasts in bone marrow without lowering of myeloid precursors can be causes of unexplained anaemia in children. Differentiating from CHA is mandatory in order to eliminate unnecessary treatment with corticosteroids and immunosuppressive agents and to avoid disturbing and erroneous diagnosis of chronic steroid or transfusion dependent anaemia. Severe protein energy malnutrition, acute or chronic infections and viral illness can be precipitating factors for the cause of disease.

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