ORIGINAL ARTICLE

A Study of Aplastic Anemia at the Department of Child Health, School of Medicine University of North Sumatera/Dr. Pirngadi Hospital, Medan

by

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Abstract

A study of aplastic anemia in children in a period of June 1980 to June 1989 was done to evaluate the pattern of aplastic anemia in children. The cases consisted of 55 children, 30 males (54.55%) and 25 females (45.45%). Most of the patients (47.27%) were found in the age group of 10 to 15 years. The complaints were paleness (90.91%), fever (56.45%) and bleeding (52.72%). The hemoglobin concentration was 4.25 ± 1.17 g/dl (mean ± SD), and the thrombocytopenia was generally severe.

Prednisone or combination of prednisone and oxymethalone was given in addition to blood transfusions, antibiotics and vitamins. The outcome was difficult to evaluate because of the irregularity of treatments. Of the 55 children, 9 (18.02%) contracted leukemia after 1 - 5 months.

Introduction

Aplastic anemia is a peripheral blood pancytopenia resulting from the absence of blood-cell formation in the bone marrow [1]

Aplastic anemia may be of congenital or acquired type. The epidemiology of aplastic anaemia is still unclear. The incidence is estimated to range from 2 to 13 in one million population per year. Age distributions in children and adult patients are similar. Generally, 1/4 of patients are in the age group of under 20 years, and it may increase after the age of over 60 years. It is also reported that the male-female ratio is 1 : 1 [1]

The clinical signs and symptoms include anemia with or without bleeding, and always followed by fever or an indication of infection. Such an anemia is caused by the absence of differentiation in erythropoietic system of the bone marrow. The peripheral blood may show a decreased hemoglobin concentration and normocytic-normochromic erythrocytes. Sometimes they may be macrocytic, with anisocytosis or poikilocytosis. Immature red cell forms may be present in the peripheral blood. The percentage of reticulocytes in the peripheral blood may be low or normal. Hemorrhage in the form of petechiae, echymosis or massive hemorrhage due to peripheral thrombocytopenia may be present. This is because of the disorders or absence of differentiation in the thrombopoietic system of the bone marrow. Sign and symptom of fever or infections in aplastic anemia are caused by peripheral blood neutropenia. This is also because of the disorder or absence of differentiation in granulogpoietic system of the marrow, whereas the bone marrow lymphopoietic system revealed relative lymphocytosis [2]

On examination, the bone marrow may show a decrease in all activities of the hematopoietic system and an increase in tissue and other cells in bone marrow [2]

The purpose of this study is to describe the pattern of aplastic anemia in children at the Sub Division of Pediatric Hematology, School of Medicine, University of North Sumatra/Dr. Pirngadi Hospital, Medan.

Materials and Methods

This study was done retrospectively in children with aplastic anemia admitted to the Sub Division of Pediatric Hematology, School of Medicine, University of North Sumatera/Dr. Pirngadi Hospital, Medan, in a period of June 1980 to June 1989.

The data collected included age, sex, onset of disease, symptoms, laboratory findings and the final condition of the patients.

Results

From June 1980 to June 1989, 55 cases of aplastic anemia in children were found; they were 7.5 months to 15 years old; 30 of them were male (54.55%) and the remaining 25 cases (45,45%) were females (Table 1).

The first symptom found in these patients with aplastic anemia (Table 2) was paleness in 50 (90.91%), fever in 31 (56.45%), hemorrhage in 29 (52.72%), and hepatomegaly in 9 (16.72%). None had splenomegaly.

The peripheral blood showed severe anemia (the mean level of Hb was 4.25 g/dl with the standard deviation of 2.17 g/dl) the lowest Hb level was 2 g/dl; the highest Hb level was 10.5 g/dl. Most of the patients i.e. 24 (43.64%) have Hb levels of 4 - 6 g/dl (Table 3).

Table 1 : *Distribution by age and sex*

Age (years)	Sex				Number
	Male		Female		
	Number	%	Number	%	
0 - 5	4	7.27	2	3.64	6
5 - 10	12	21.82	11	20.00	23
10 - 15	14	25.45	12	21.82	26
Total	30	54.55	25	45.45	55

Table 2 : *Symptoms*

Symptoms	Number	%
Paleness	50	90.91
Fever	31	56.45
Manifestation of hemorrhage	29	52.72
Hepatomegaly	9	16.72

Table 3 : *Hemoglobin levels*

Hb (g/dl)	Patients	
	Number	%
2 - 4	6	10.91
4 - 6	24	43.64
6 - 8	14	25.54
8 - 10	2	3.84
10	1	1.82
Total	55	100.00

Table 4 : *WBC counts*

WBC (/ul)	Patients	
	Number	%
500 - 1500	4	7.27
1500 - 2500	12	21.82
2500 - 3500	16	29.09
3500 - 4500	14	25.45
4500 - 5500	5	9.09
5500 - 6500	2	3.64
6500 - 7500	2	3.64
Total		

The WBC count showed a mean level of 3327/ul with the standard deviation of 1389/mm^3; the lowest level of WBC was 100/ul, the highest 7000/ul. Most of the patients i.e. 16 (29.09%) had WBC counts of 2500-3500/ul (Table 4).

The platelet count showed a mean level of 23000/ul, with the standard deviation of 80509/ul, the lowest being 0 and the highest 137000/ul. Most of the patients i.e. 36 (65.45%) had platelets counts 0 - 2000/ul (Table 5).

Table 5 : *Platelets counts*

Platelet counts (/ul)	Patients	
	Number	%
0 - 20000	36	65.45
20000 - 40000	11	20.00
40000 - 60000	4	7.27
60000 - 80000	1	1.82
80000 - 100000	2	3.64
100000 - 120000	-	-
120000 - 140000	1	1.82
Total	55	100.00

Table 6 : *Lymphocyte count*

Lymphocytes (%)	Patients	
	Number	%
30 - 40	2	3.64
40 - 50	-	-
50 - 60	13	23.64
60 - 70	15	29.09
70 - 80	9	16.36
80 - 90	7	12.73
90 - 100	9	16.36
Total	55	100.00

Differential counts showed a relative lymphocytosis (the mean level of lymphocytes was 70% with the standard deviation of 15%; the lowest being 34% and the highest 93%). Most of the patients i.e. 28 (52.73%) had lymphocytes counts of 50 - 70% (Table 6).

The peripheral blood showed reticulocytopenia, and the erythrocyt morphology showed anisocytosis, poikilocytosis hypochrome and anulocytes. The bone marrow showed hypocellular and acellular pictures.

The treatment consisted of prednisone or the combination of prednisone and oxymethalone. Seven of those children (12.7%) got transfusions alone; 4 of them (7.24%) died and 3 (5.45%) the progress were out of follow up illness after blood transfusions.

The course and development of the disease could not be analysed because they failed to have the regular treatments.

The duration of disease before admission range from 1 week to 6 months.

The duration of treatment were mostly ranging from less than 1 week to 2 months.

The number of patients who had treatment of less than 1 week were 17 patients (3 died), more than 6 months 7 patients (4 had remissions, 1 remission and 2 died). The patients who had the longest treatment (3 years) had remissions.

Of the 55 patients, only 5 (9.09%) had remissions, 9 (16.36%) died of herrohage and infections (3 patients died during treatment within less than 1 week, and 2 patients died after treatment of more than 6 months). Most of the patients could not be evaluated because of the irregularity of treatments or had no follow up.

Nine patients (16.36%) develope acute lymphoblastic leukemia after 1-5 months since the first examination. The diagnosis of acute lymphoblastic leukemia was made based on the persistent clinical symptoms the findings of blast cells in the peripheral blood and monotonous picture of bone marrow specific. All of the patients got the treatment of Protocol II. Five patients (9.09%) died during treatment, and 4 patients could not be followed up (Table 7).

Table 7 : *Duration of treatment and final condition*

Duration of treatment	Number	Final Condition				
		Remission	Non remission	Death	Missing	Leukemia
- 1 week	17	-	-	3	14	-
- 1 month	9	-	-	2	7	3**
- 2 months	10	-	4	-	6	-
- 3 months	5	1	3	1	-	-
- 4 months	3	-	2	1	-	3*
- 5 months	3	-	3	-	-	1
- 6 months	7	4	1	2	-	2**
Total	55	5	14	9	27	9

Discussion

Distributions of patients by sex (54.55% males and 45.54% females) were nearly similar. This is an accordance with the report by Alter (1981) [1] while Untario et al, (1970) [3] reported that the incidence was higher in males.

Generally, the patients came with paleness as the main complaint, fever or hemorrhage, low hemoglobin level and severe thrombocytopenia and zero thrombocyte count may also be present as report by Untario et al., (1970) [3].

Similar with many other studies, hemorrhages were generally found in the skin (petechiae, ecchymoses, and hematoma), or mucous membrane (gum bleeding and epistaxis) [2].

Many efforts have been made to assess the relationship between the clinical manifestation and laboratory findings with the outcome of aplastic anemia, such as age at onset, sex, etiology, severity of pancytopenia and panmyelophtysis, level of fetal hemoglobin and lymphocytes in bone marrow etc., but the results remain controvensial.

Seventeen children had treatment for less than one week; four of them died during treatment, while seven children had been followed up more than 6 months.

Treatment with prednisone was given to 31 children while combined therapy in 17 children. The effects of treatment were difficult to evaluate because of the irregularity of treatment.

According to the literature, combined therapy may be better than prednisone alone [1, 2, 4].

Of the 55 children with aplastic anemia, 9 (16.36%) contracted leukemia. Other studies demonstrated variable outcomes of the preleukemia incidences. Markum et al., (1972) [5] found 14 cases of aplastic anemia in a period of two years (1969-1970), Choundry et al., (1982) found 3 cases of LLA out of from 150 patients, 9 years after having previously diagnosed as aplastic anemia [6].

Conclusions

1. In 55 children with aplastic anemia, the distribution of sex for all age groups was nearly similar.
2. Paleness (pallor), fever and hemorrhage were the most often complaints.
3. In general, the patients had irregular treatments, so that the outcome was difficult to evaluate.
4. Nine children (16.36%) had leukemia within 1-5 months after the first examination.

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