ORIGINAL ARTICLE

Corticosteroid in the Treatment of Cerebral Malaria

by

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Abstract

From January 1978 up to December 1980, twenty patients diagnosed with cerebral malaria were admitted at the Department of Child Health, Medical School, Sam Ratulangi University, General Hospital, Manado.

They were treated with chloroquin (10 mg/kg body weight/day) intramuscularly, divided into two equal daily doses for consecutive 1-3 days, then continued by chloroquin orally for three more days. All patients also received intravenous fluid drips, symptomatic treatment, and cortisone acetate (15 mg/kg body weight/day) intramuscularly divided into three equal daily doses for three days.

Four (20 %) of the cases proved fatal. The remaining 16 (80 %) recovered within 8½ days on the average, and regained complete consciousness generally within 2¾ days. No after effects were reported.

Presented at the fifth National Paediatric Congress, Medan, June 14-18.
Received 11th March, 1982.

Introduction

Cerebral malaria is one of the major complications of malaria, with acute clinical symptoms and it is usually caused by plasmodium falciparum. Victims usually have high fever, and in a short time the consciousness decreases with or without accompanying convulsions.

Robbins and Angell (1976) reported that in cerebral malaria there was a disturbance in the brain, for example capillary thrombosis, causing local inflammatory reaction and local oedema. Thrombosis arose due to disseminated intravascular coagulation and in turn was the reason for the reaction between parasitized erythrocytes, as antigens and trombocytes, as antibodies.

The additional use of corticosteroid in treating cerebral malaria was recommended by Adams and Maegraith (1971), Bruce Chwatt (1977), and Hall (1976). Goodman and Gillman (1975) stated that corticosteroid was effective as anti-inflammatory and anti-oedematous agent thus maintaining microcirculation.

This study was made to find out the effectiveness of corticosteroid in the treatment of cerebral malaria.

Material and Methods

All patients with a diagnosis of cerebral malaria who were admitted to the Department of Child Health, Medical School, Sam Ratulangi University, General Hospital, Manado from January 1, 1978 to December 31, 1980 were included in this study.

The diagnosis was based on the following criteria :

1. Parasitemia (plasmodium falciparum)
2. High fever
3. Cerebral manifestations such as :
   a. Lowering of consciousness (from apathy to coma)
   b. Uncontrollable behaviour
   c. Change in behaviour (confusion/ disorientation)
   d. Convulsions
4. Cerebrospinal fluid within normal limits. Patient with abnormal cerebrospinal fluid were excluded from this study.

All patients were treated with :

— Intravenous fluid drip composed of equal volumes of NaCl 0.9 % and dextrose 10 %.

— Chloroquin (i.m.) 10 mg/kg body weight/day, divided into two equal doses, administered for 1-3 days; followed by chloroquin orally with the same daily doses for three days.

— Cortisone acetate (i.m.) 15 mg/kg body weight/day, given in three equal daily doses for three days.

— Patients showing signs of secondary bacterial infections were given appropriate antibiotics.

— Diazepam, given in cases of convulsions.

— Transfusions of fresh blood, in cases of severe anemia.

Laboratory examinations for malaria parasites and thrombocyte counts were carried out once a day for five successive days.

Results

From Januari 1, 1978 to December 31, 1980, twenty patients suffering from malaria were hospitalized, out of whom 4 (20 %) died.

On the average the patients recovered within 8½ days and regained or attained improvement of conciousness within 2¾ days; no further side effects were detected or reported.

The age of the patients hospitalized were between 1 year 5 months and 12 year 4 months. Of the 4 (20 %) patients who died, all were under 5 years of age.

TABLE 1 : *Relationship between age and death rate.*

Age	Number of cases	Death	Percentage
Under 5 years	9	4	44.4 %
Over 5 years	11	0	0 %

The length of illness, first identified by fever, before hospitalization was between 2-13 days, with an average of 4½ days.

Enlargement of the spleen (SI - SIII) was found in 13 (65 %) of the patients, while enlargement of the liver was found in 16 (80 %).

Thrombocytopenia (thrombocyte count less than 150.000/mm³) was found in 6 (30 %) patient of whom 3 died.

TABLE 2 : *Relationship between thrombocyte count and death rate.*

Thrombocyte count	Number of cases	Death	Percentage
Less than 150.000/mm³	6	3	50 %
More than 150.000/mm³	14	1	7.1 %

Patients suffering from a decrease of consciousness were as follows: somnolent to comatose 15, confusion/disorientation 3, and uncontrolled behaviour 2.

Laboratory results showed positive malaria parasites in 20 cases during the first day, in 11 cases during the second day, in 2 cases during the third day. Anemia (haemoglobin concentration of less than 10 gm/dl), and of these 2 died before having received any blood transfusion. Bronchopneumonia was found in 2 patients, of whom one died. No complications were found due to drug administration.

Discussion

Cerebral malaria, stemming from malignant tertian malaria (falciparum), exhibits serious complications with noticeably high death rates. All patients in this study were admitted to the General Hospital with high fever, decreased consciouness, and convulsions. On the average the fever continued for 4½ days, with a range of 2 to 13 days.

Patients were more quickly hospitalized when convulsion and lowering of consciousness were manifest at home. Lowering of consciousness mostly somnolent to comatose was evident in 15 patients; confusion and/or disorientation in 3 patients; and uncontrollable behaviour in two patients. The clinical picture of these cases was similar to that reported previously from the same hopital by Munir et al. (1976).

From Table 1, we can see that the number of deaths among children below five years of age was 44.4 % (4 out of 9 patients). This showed that cerebral malaria was more dangerous in children below five years of age. This coincides with Gilles (1966) who stated that cerebral malaria was more severe in children from the ages of 6 months to about five years.

According to Robbins and Angell (1976), cerebral manifestations of malaria were caused by capillary thrombosis which in turn caused inflammatory reaction with local oedema. This thrombosis occurred due to D.I.C., while this latter in turn was the result of the reaction between parasitized erythrocytes as antigen, and thrombocytes, as antibodies. Devakul et al. (1966), Paar et al. (1970) as well as Robbins and Angell (1976) stated that in cerebral malaria, D.I.C. often occurred. However, Vreeken and Cremer Goote (1978) found that D.I.C. rarely occurred in cerebral malaria.

As the drug of choice, Borochovitz et al. (1970), Punyagupta et al. (1974), and Smithkamp and Wolthuis (1971), recommended heparin in cases of cerebral malaria.

On the other hand Adams and Maegraith (1971), Bruce Chwatt (1977), Hall (1976), Vreeken and Cremer Goote (1978) recommended the administration of corticosteroid. Goodman and Gillman (1975) stated that corticosteroid affected the central nervous system and it also was effective as an anti inflammatory and anti oedematous agent, and in maintaining microcirculation.

Borochovitz et. al. (1970), and Vreeken and Cremer Goote (1978) reported the presence of thrombocytopenia and decrease of the concentration of blood clotting factors. We found 6 patients with thrombocytopenia, while Munir et. al. (1976) reported no findings. D.I.C. among these patients composed probably a small percentage. In table 2, we can see that the number of fatal cases among those with thrombocytopenia was 3 out of 6 (50 %), while only 1 out of 14 (7.1%) of those without thrombocytopenia died. From this outcome we can see that patients with thrombocytopenia and the possibility of contracting D.I.C., although already treated with corticosteroid, still had a high fatality rate.

In this study the death rate was 1 out 14 cases (7.1%) among those suffering from cerebral malaria without thrombocytopenia. Munir et. al. (1980) found in the same hospital between July 1, 1973 and October 31, 1977 on one similarly afflicted group receiving the same procedure of treatment except for the administration of heparin and corticosteroid, a death rate of 12.5%. In another control group receiving the same procedure of treatment but with neither heparin nor corticosteroid, the death rate was 76.5%.

Summary

From January 1, 1978 to December 31, 1980 a group of 20 patients suffering from cerebral malaria we found a death rate of 20%.

Among the 16 (80%) recovered patients, the period of hospitalization was on the average 8½ days and the regaining or improving of consciousness was approximately 2¾ days. No after affects were found.

In conclusion, corticosteroid treatment has positive results and should be recommended in the treatment of cerebral malaria, excluding thrombocytopenia or D.I.C.

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