Treatment of Severe Malaria in Children

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OBJECTIVE: To determine the optimum management of severe malaria in children.

BACKGROUND: During 1974 clearcut guidelines were developed at Trad for the management of severe malaria in adults. Specifically the maximum safe daily dose of quinine in adults was 20 mg/Kg. This confirms work performed in Malaysia 50 years ago but in the intervening period 30 mg/Kg has emerged as the recommended daily dose. Also at Trad in 1974 we determined that the maximum safe daily fluid intake was 1500 ml in adult patients with falciparum malaria. During this study period, it became apparent that the mortality rate of severe falciparum malaria in small children was high. The onset of convulsions is a frequent and grave complication in small children. The management of severe malaria in children has received little attention in the literature. Another problem is the difficulty often encountered in setting up or maintaining an intravenous infusion because of the small veins in infants.

DESCRIPTION: The children described in this study were treated at the Trad Provincial Hospital in Southeast Thailand. They were first evaluated in SEATO outpatient clinic and then admitted to the ward. Most of the patients were treated between April and July 1974 since there was an unusually high proportion of sick children presenting to the hospital during this interval. The use of the metering chamber (capacity 100 ml) was introduced so that precise volumes could be infused into the children.

PROGRESS: The most difficult problems in management occurred in small children and infants. Children above the age of 12 years could be treated similarly to adults except the dosage of any medication was best determined on a mg/kg basis. Therefore only the data on children aged 12 years and less are included in Table 1. Most of the children noted in the Table were very seriously ill on admission. It is difficult to infuse an effective but not toxic dose of quinine; therefore, details on the amount of quinine given as the first dose are shown in the Table. The recommended daily dose of quinine is not more than 30 mg/Kg/day or 10 mg/Kg every 8 hours. Most of the children received only one infusion every 24 hour interval because of the difficulty in initiating and maintaining infusions.

Early in the study the question arose whether 5 mg/Kg might not be a safer dose of quinine than 10 mg/Kg in children. However Case No. 630 and Case No. 684 were both admitted gravely ill and died a few hours after admission. They received smaller doses of quinine (5—6 mg/Kg). Whatever dose of intravenous quinine was used, some children improved and others deteriorated; however, in general, 5 mg/Kg appeared to be a safe and non—toxic dose of quinine. Some interesting case — histories are now given.

Cases 649—651. These three children, aged eight, five, and three years were siblings admitted at 1500 hours on 18 May 1974. Cases 649 and 651 were alert but toxic. Case No. 650, the three year old girl, was almost in coma. All three children received half—strength quinine, i.e. 0.5 mg/ml normal saline. Cases 649 and 650 received 5.0 mg/kg over about a four hour interval and 651 received 4 mg/Kg. All the patients improved and oral quinine therapy was commenced the next day. Case 649 received one tablet of quinine at 0600, 1400 and 2100 hours, case 650 received 1/2 tablet crushed in water at 0600 and 1400 hours and case 615 received 1/2 tablet at 0600, 1400 and 2100 hours. All the patients then received a dose of Fansidar. All three patients were radically cured although two had a mild *P. vivax* infection on day 28. None of these children was desperately ill, but all responded well to a half—dose of intravenous quinine.

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Case 686. This one year old child was admitted very breathless and crying. His pulse rate was 160 and respiratory rate 70. The liver and spleen were enlarged and hematocrit 24 per cent. He was drinking satisfactorily. To avoid pulmonary edema, a small volume (50 ml) containing 50 mg quinine was infused over a five hour interval. Oral quinine was then administered as a 1/2 tablet crushed in water every 12 hours, for a total of six doses. A 1/2 tablet of Fansidar was then given. The child made a satisfactory recovery.

DISCUSSION: Severe falciparum malaria in small children has a serious prognosis. Intravenous quinine therapy should be administered slowly in small amounts. The appropriate initial dose is usually 5 – 10 mg/kg administered as an intravenous infusion. Satisfactory results have been achieved by giving maintenance therapy as oral quinine when the patients' condition has improved. In infants, 1/2 tablet plain quinine crushed in water can easily be administered by the mother every 12 hours under close professional supervision. Repeated small doses of intravenous quinine should be administered if the child remains severely ill.

Table 1. Details of Initial Dose of Quinine in Children Aged 12 Years or Less with Severe Falciparum Malaria

Case Number	Age (yr)	Weight (Kg)	Parasite Count	Hematocrit (%)	First Dose Quinine (mg)	Volume Infused (ml)	Infusion Time (Hours)	Initial Dose (mg/kg)	Comment
609	7	?10	458000	38	180	180	5.0	? 18	Died
613	9	19	160000	23	180	180	4.5	9.5	
630	12	?25	334000	16	125	125	2.5	?5.0	Died
640	2	10	1200000	11	117	235	12.0	12.0	Died
644	4	14	95000	24	82	165	5.0	6.0	
648	11	21	430000	31	100	200	6.0	5.0	
649	8	20	333000	33	95	190	4.0	5.0	
650	3	11	178000	29	55	110	3.7	5.0	
651	5	14	238000	30	55	110	3.7	4.0	
660	1.5	8	54000	18	40	80	5.0	5.0	
665	2	13	113000	20	45	90	4.0	4.0	Not enough Quinine
681	11	?	56000	12	350	?	?	? 17	Died
683	4	14	370000	32	150	250	5.0	11	
684	1	5	450000	12	31	63	6.0	6.0	Died
685	4	14	210000	26	100	100	3.0	7.0	
686	1	8.5	53000	24	50	50	5.0	6.0	
F27	5	18	65000	39	180	180	2.0	10.0	
F28	11	28	287000	41	210	210	3.0	7.5	
F31	8	20	258000	32	180	180	4.3	9.0	