

CASE REPORT: DENGUE SHOCK SYNDROME IN A TWO MONTH OLD CHILD

Principal Investigators : Suchitra Nimmannitya, M.D.
Ananda Nisalak, M.D.
Donald S. Burke, LTC, MC

OBJECTIVE : To investigate the mechanisms whereby a 2 month old child developed DSS.

BACKGROUND : In Bangkok virtually all cases of DSS occur in children with circulating anti-flavivirus antibodies. In children older than one year this is presumably due to previous infection with a different dengue virus type, while in children less than one year this antibody presumably is derived transplacentally from the child's mother and subsequently disappears from the child's blood with a half life of 3-4 weeks. In children less than one year old, most cases of DHF occur in children between the ages of 6 and 11 months, at a time when maternal antibodies have fallen below protective levels; cases of DHF in children less than 4 months old are distinctly unusual. The occurrence of Grade IV DSS in a 2 month old child therefore merited special attention.

CASE REPORT : A 71 day old Thai male infant was admitted to Bangkok Children's Hospital on 2 August 1979 with a history of 3 days of fever and one day of melanic stools. The child was the product of a normal gestation and delivery, and had shown normal development. The patient's 24 year old mother had had a fever for 3 days before the onset of the child's illness but had continued to breast feed the infant. On admission physical examination the child was 58 cm. long and weighed 5.5 kilograms. The temperature was 35.5°C. The skin showed scattered purpuric lesions. A tourniquet test was equivocal. The liver extended 2 centimeters below the costal margin. On admission the hematocrit was 38, the WBC 13,000 (with 45% small lymphs and 7% atypical lymphs) and a platelet smear showed only 0-2 platelets per field. Despite institution of intravenous fluids the child rapidly progressed to shock with an unobtainable blood pressure and lethargy. Continued therapy restored the blood pressure, and the child was discharged on the 7th hospital day without sequelae.

Acute, two week, and 24 week convalescent HAI antibody titers of both the child and the mother are presented in Table 1. The patient shows a typical primary type infant pattern, i.e., pre-existing broadly reactive low titered HAI antibodies with a clear cut rise at two weeks which has fallen by 24 weeks. Sucrose density gradient fractionation of the two week convalescent serum specimen (Table 2) shows definite evidence of an IgM response which is greater than the IgG response.

Of special interest was the finding that the patient's mother had a high fixed antibody titer during the time of the child's acute illness, strongly suggesting that she also had been infected with a flavivirus at or about the time of the child's illness.

If the reasonable assumption is made that both mother and son were infected by the same virus strain (and therefore the same virus type) then it can be concluded that :

1. The mother was not immune to that type at the time of delivery, for she was susceptible to infection two months later.

2. The son was not immune to that type at any time in his life because the antibodies he received transplacentally from his mother were not protective.

Therefore, no time was required for the patient's antibody level to drop below "protective levels," and infection at two months of age was possible.

A corollary question arises about the mechanisms of disease acquisition in mother and son in this case. Simultaneous acquisition of disease by near simultaneous bites of both mother and son by an infected mosquito is the most likely explanation. However, as the mother was ill and continued breast feeding the child at the time of his illness, the possibility of maternal-child disease transmission by ingestion of infected milk (? with virus in leukocytes) must be considered.

Finally, it is striking that although both mother and infant son had similar circulating antibodies and were presumably infected by the same virus strain, the infant developed grade IV DSS while the mother had only a very mild illness. Much remains to be learned about the factors (such as age) which predispose individuals to develop severe illness as a consequence of infection with dengue viruses.

Table 1. HAI Antibody Titers

<u>Mother</u>	<u>Whole serum HAI titer vs</u>				
	<u>D1</u>	<u>D2</u>	<u>D3</u>	<u>D4</u>	<u>JEV</u>
6 Aug 79	5120	5120	>10240	>10240	>10240
16 Aug 79	>10240	5120	>10240	>10240	2560
21 Jan 80	320	320	640	640	160
<u>Child*</u>					
2 Aug 79	10	20	20	20	0
16 Aug 79**	80	160	40	160	20
21 Jan 80	10	40	10	10	<10

* Child's date of birth = 23 May 1979

** IgM positive (see Table 2)

Table 2. Sucrose Density Gradient Fractionation of Child's Serum to Detect 19S Antibodies

<u>Child</u>	<u>HAI Titer of SDG Fraction vs D2</u>	
	<u>Fraction 3</u>	<u>Fraction 7</u>
	<u>(19S)</u>	<u>(7S)</u>
	<u>NoME/(+)ME</u>	<u>NoME/(+)ME</u>
2 Aug 79	<4/<4	8/8
16 Aug 79	32/<4	16/8