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LIVE VARICELLA VACCINE: PREVENTION OF NOSOCOMIAL INFECTION AND PROTECTION OF HIGH RISK INFANTS FROM VARICELLA INFECTION

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For prevention of nosocomial infection, 25 infants including high risk patients received an emergency injection of live varicella vaccine. Three patients developed a rash within 5 days after vaccination, but their symptoms were mild. The other 22 showed no clinical symptoms and gave an immune response.

Twenty-two patients receiving immunosuppressive therapy were vaccinated and 20 of them showed a positive response in the varicella skin test. Of 14 vaccinated patients with malignancies, 2 giving a positive skin test, later showed clinical varicella, but their symptoms were not severe. One case with ALL was immunized safely under very poor conditions during the first induction therapy. No complications were observed in any patients.

INTRODUCTION

Varicella-zoster virus is very infectious, and infection of immunocompromised patients causes severe symptoms with a high mortality rate. A live varicella vaccine developed by Takahashi (Takahashi et al., 1974) has been used safely and effectively for such infants in many hospitals (Ha et al., 1980; Katsushima et al., 1982). In this report we describe our experience in the use of this vaccine for protection against nosocomial infections (emergency vaccination) and also for protection of high risk infants from infection with varicella.

MATERIALS AND METHODS

Live varicella vaccine (Oka strain) and skin test solution (Kamiya et al., 1977) were supplied by Professor Takahashi. Vaccine was injected subcutaneously at doses 375 to 1,000 (usually 500) plaque-forming units per person.

During 5 outbreaks of varicella between May '79 and June '81, 25 hospitalized children with no past history of varicella who gave a negative varicella skin test were selected as subjects for emergency vaccination. They were vaccinated with the consent of their parents.

The high risk group of 22 vaccinees consisted of 14 with malignancies [9 ALL (acute lymphocytic leukemia), 2 AML (acute myelocytic leukemia), 1 yolk sack tumor, 1 embryonal carcinoma, 1 neuroblastoma], 6 with the nephrotic syndrome etc. and 2 with the West syndrome. Of these, 5 children received emergency vaccination at the time of an outbreak of varicella. All of them had been re-

ceiving anticancer or immunosuppressive therapy.

RESULTS AND DISCUSSION

1. *Emergency vaccination* (Table 1)

The first case of varicella occurred in late March '79, and 4 other cases occurred within the next 30 days. Varicella vaccination was started on May 1.

At that time, 35 infants were hospitalized in our pediatric ward: there were 2 varicella patients, 9 patients with a past history of varicella, and 24 susceptible patients. Among these susceptible patients, 9 received vaccination and 8 did not. The other 7 patients were discharged from hospital.

Two of the 9 patients who received vaccination developed a rash, but their symptoms were mild. Among the 8 patients who did not receive vaccination, 4 patients developed varicella, one case developing after 20 days. The remaining 4 patients were 3 newborn babies, one being in an incubator.

In the first episode, 11 patients were vaccinated, including 2 who were hospitalized after the beginning of vaccination.

Subsequently, there were 4 outbreaks of varicella in our ward and, in all, 25 patients were vaccinated. Three of these developed a rash 2, 4 and 5 days, respectively, after vaccination, but their symptoms were mild. Probably they were in the latent period at the time of vaccination. In the other 22 patients who were immunized, the vaccine was effective.

TABLE 1. *Inhibition of nosocomial infection by varicella vaccination*

	No. of vaccinees	No. of rash	Days of appearence of rash	Symptoms
May '79	11	2	days 4 and 5	mild
Dec. '80	4	0		
Feb. '81	6	0		
Feb. '81	1	1	day 2	mild
Jun. '81	3	0		
Total	25	3		

2. *Vaccination of high risk children* (Table 2)

Twelve of the 14 children with malignancies who were vaccinated showed a positive response in the skin test, but 2 of them developed clinical varicella 11 and 21 months after vaccination. Two children with AML did not give a positive response in the skin test although they received vaccination during remission. One of them received 2.5 g of im-

TABLE 2. *Vaccination of high risk infants with immunocompromised diseases*

	No. of vaccinees	Varicella skin test after vaccination	No. with rash	Time of appearance of rash after vaccination	Symptoms
Malignancy	14	(+) 12	2	11 month	mild
ALL 9				21 month	moderate
AML 2		(−) 2[a]	1	27th day	mild
other 3					
Nephrotic syndrome, etc.	6	(+) 6	0		
West syndrome	2	(+) 2	0		
Total	22	(+) 20	3		
		(−) 2			

[a] One case received 2.5 g of immunoglobulin on day 2, and developed varicella on day 27. Another one case received a second vaccination after 3 months, after which the skin test became positive.

munoglobulin on day 2 after vaccination; the skin test on day 17 was negative, and on the day 27 varicella developed. The other child whose skin test was negative on days 21 and 84, received a second vaccination 3 months after the first vaccination. After this the skin test was positive.

All 8 children with the nephrotic syndrome and the West syndrome were vaccinated without complication and gave positive reactions in the skin test.

It is noteworthy that varicella developed in a few children with malignancies even though they gave positive reactions in the skin test at one time. For example, a 4-year-old boy with ALL was vaccinated during remission 18 months after the onset of illness because his father suffered from herpes-zoster. In spite of the fact that he gave a positive reaction in the skin test 15 days after vaccination, he developed varicella after 11 months, but the symptoms were mild. He also gave a positive reaction in the skin test 3 days before the appearance of a rash. A second case of ALL, a 7-year-old boy, was vaccinated one month after the onset of ALL. He gave a positive reaction in the skin test on days 17 and 25. After that, he suffered relapses and remissions of ALL. After 21 month he developed varicella, possibly due to a long period of anticancer therapy.

3. *Emergency vaccination of a case in very poor clinical condition*

Children, especially those with leukemia, should be vaccinated under good conditions (Izawa et al., 1977), but occasionally even when the clinical condition is bad, emergency vaccination is necessary (Ozaki et al., 1978; Nakagawa and Katsushima, 1978).

A 3-year-old boy with newly developed ALL was admitted to our hospital during an epidemic of varicella. A skin test for varicella and a test for serum antibody both gave negative results. A few days after his admission, varicella developed in children in the adjacent room. His parents requested emergency vaccination. Therefore, he received vaccination under very poor immunological conditions during the first induction therapy. He had received vincristin 7 days previously and leukocytes in his peripheral blood had decreased to 1300/mm^3 at the time of vaccination. On day 4 after vaccination he received 2.5 g of immunoglobulin. He showed complete remission and did not catch varicella. Moreover, he gave positive reaction in the skin test on days 18 and 46 after vaccination.

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