SENSITIVITY REACTION TO POLIOMYELITIS VACCINE

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Poliomyelitis vaccine is exceedingly safe and very rarely causes any unpleasant sequelae. This has been the experience in the United States of America, the United Kingdom and South Africa.

The following case report illustrates an anaphylactic reaction following 4 hours after the injection of poliomyelitis vaccine. An unusual feature was the development of tetany.

CASE REPORT

A 26-year-old European housewife has been suffering from hay fever since the age of 14 years. For the past 18 months she had attacks which were considered to be asthmatic. A skin test was carried out by a specialist in allergy and the patient was found to be sensitive to mixed grass pollen. Desensitization was carried out. During the course of the desensitization, after the 5th injection, she required to have poliomyelitis vaccine. The first injection of vaccine (prepared by the Poliomyelitis Research Foundation, Johannesburg) caused no difficulty. A month later the second injection was given; within 4 hours she developed severe abdominal cramps and vomiting. At first there was no respiratory embarrassment, but when the doctor was called, the patient was collapsed and there was evidence of peripheral circulatory failure and peripheral cyanosis. The pulse was fast, blood pressure unrecordable, respiration was rapid and wheezing, and she complained of severe abdominal pain. Manifestations of tetany were observed, the patient exhibiting spontaneous carpopedal spasm and irritability of the facial nerve (Chvostek's sign). Adrenaline was administered immediately (0·5 ml. of a 1 in 1,000 solution, subcutaneously) followed by 15 mg. of mephentermine sulphate (wyamine) intravenously. There was an improvement for the next half an hour, but then the patient's condition deteriorated. Promethazine (phenergan) was given intramuscularly with good effect. Calcium gluconate solution intravenously appeared to improve the manifestations of tetany though irritability of the facial nerve persisted for several hours after the general condition had improved.

Treatment with antihistamine drugs and intravenous calcium gluconate was continued for 24 hours. She was then quite well and no other manifestations of sensitivity developed. The patient had received several injections of penicillin 5 years and 7 years previously, with no ill effects.

COMMENT

Injections of poliomyelitis vaccine have been reported to cause skin rashes as well as anaphylactic reactions. The vaccine generally contains culture medium, horse serum or bovine serum, soluble monkey protein from blood or kidney, formaldehyde, preservatives, polio virus, and antibiotics (penicillin). The cultures are well washed to get rid of the serum before the addition of the virus phase of the medium and, according to regulations, the dilution of serum should be less than 1 in 1,000,000.[1]

It is generally assumed that the penicillin content, however minute, acts as the allergen in reactions to polio vaccine. This assumption is based upon the observation that a penicillin-free vaccine does not cause reactions in sensitive patients and upon reports that penicillinase protects against reactions. Zimmerman[2] described 6 patients, all with a previous history of sensitivity to penicillin, who developed urticaria or bullous dermatitis a few days after poliomyelitis vaccination. In all these patients the reaction to the vaccine duplicated the previous reaction to penicillin and there was rapid clearing of the condition after a single injection of penicillinase. The patients did not react when a penicillin-free vaccine was administered subsequently.

In the vaccine prepared by the Poliomyelitis Research Foundation, Johannesburg, the amount of penicillin added to the fluid used in preparing the cultures is 100 units per ml., that is, per one dose, but in the final vaccine the penicillin has deteriorated to such an extent that its presence can no longer be detected. However, as Gear[1] points out, though the bactericidal and static activities may have diminished to vanishing point, its allergenic capacity may not have altered to the same extent!

It has been reported from the USA[3] that vaccines prepared by commercial drug manufacturers in America contained amounts of penicillin varying from 0.001 μ./ml. to less than 20 μ./ml., but the amounts of penicillin reported to have caused anaphylactic reactions is sometimes minute. Brierlein[3] reported a patient developing shock from an intracutaneous skin test with 3 one-millionths of 1 unit of penicillin. This patient had a passive transfer skin test positive to 1 in 25 dilution of poliomyelitis vaccine.

Calculating from vaccine issues in the Union of South Africa it is believed that approximately 750,000 persons have been vaccinated and the total number of reactions reported has been small.[1] However, most of the injections have been given to children, and children rarely manifest anaphylaxis.[4] Skin rashes, usually urticaria, have been reported to the Poliomyelitis Research Foundation and in a few children suffering from asthma the inoculation has apparently precipitated attacks.

The patient described in the present paper was a highly allergic subject who had received injections of penicillin previously with no ill effect; indeed she did not react to the first dose of vaccine. It is presumed that penicillin is the offending constituent in this instance.

Of interest was the occurrence of tetany. Anaphylaxis is usually accompanied by bradypnoea, but the increased expiratory effort can conceivably cause respiratory alkalosis with resulting increase in excitability of nerve tissue. Anxiety would contribute to the process. In our patient, it was debated whether hyperventilation alone accounted for the clinical picture, but this did not explain the shock, the bronchospasm, the fall in blood pressure, the abdominal manifestations, and the response to adrenaline.

REFERENCES

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