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Vaccine-associated Paralytic Poliomyelitis : A Case Report of Flaccid Monoparesis after Oral Polio Vaccine

This report describes a case of acute flaccid paralysis after administration of oral polio vaccine (OPV). A 4 month-old male patient with the decreased movement of left lower extremity for 1 month was transferred to the Department of Pediatrics. He received OPV with DTaP at 2 months of age. Flaccid paralysis was detected 4 weeks after OPV immunization. Attempts to isolate Sabin-like viruses in the two stool and CSF samples failed because those specimens were collected more than 2 month after the onset of paralysis. Hypotonic monoparesis (GIV/V), hypotonia and atrophy on the left lower extremity, and ipsilateral claw foot persisted for more than 18 months, while we followed him with rehabilitation therapy. This is the first case of officially approved, recipient vaccine-associated paralytic poliomyelitis in Korea.

Key Words : *Poliovirus vaccine, Poliomyelitis*

Sun Jun Kim, Sung Han Kim*, Young Mee Jee*, Jung Soo Kim

Department of Pediatrics, Chonbuk National University, Medical School, Jeonju; Division of Enteric and Hepatitis Viruses*, National Institute of Health, Seoul, Korea

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Address for correspondence
Sun Jun Kim, M.D.
Department of Pediatrics, Chonbuk National University Hospital, 638-18 Keumam-dong, Dukjin-gu, Jeonju 561-712, Korea
Tel : +82.63-250-1799, Fax : +82.63-250-1464
E-mail : sunjun@chonbuk.ac.kr

INTRODUCTION

Although Poliomyelitis caused by wild-type poliovirus has been almost eradicated, especially in developed countries, vaccine-associated paralytic poliomyelitis (VAPP) cases still continue to occur in most of developed and developing countries. In Korea, the last indigenously acquired cases of poliomyelitis caused by wild poliovirus were reported in 1983, and the eradication of wild poliomyelitis in Korea was certified in October 2000. Korea is now in the midst of maintaining polio-free status.

Live attenuated oral polio vaccine (OPV) has been successfully used to control wide-type poliomyelitis over the past 30 yr. Although it has several advantages such as low cost, ease of use, and high efficacy rate with herd immunity (1), OPV has a drawback of causing a rare but serious complication of vaccine associated paralysis. Furthermore, VAPP cases cannot be distinguished clinically from the wide-type poliomyelitis (1).

In India a report described 181 VAPP cases among 125 million children less than 5 yr of age in one year, of 1.45 per million children per year, or seven cases per million birth cohorts (2, 3). Assuming an annual average of 45 cases in Latin America, the total in Latin America and India experienced 226 cases a year. The annual incidence of VAPP in European countries, according to the WHO, is 0.4-3.0 per million vaccinated children (1). In the U.S.A., an estimated risk for VAPP ranged from 1 case per 2.5 million doses of OPV distributed in 1980-89 (4) to 1 case per 3.2 million doses distributed in 1973-84 (5).

In Korea, OPV was introduced in 1962, about 4 yr after the first implementation of IPV, and has been used alone since 1975 for the prevention of poliomyelitis. As the statistics from the WHO show, it is apparent that as long as OPV is in use, there is always the risk of VAPP to occur regardless of where it is used. The over all risk for VAPP is approximately one case in 2.4 million doses of OPV vaccine with a first dose risk of one in 750,000. When considering the birth cohort and the amount of OPV distributed in Korea, an occurrence of 0.5-2 cases of VAPP a year can be expected. Unfortunately, however, since the day of OPV administration started in Korea, there has not been any VAPP case reported so far. This is the first case of a recipient VAPP confirmed in December 2003 by the (Korean) National Committee on Certification of Poliomyelitis. We hope this report will be an initiative in finding more cases of VAPP and also facilitate the epidemiological surveillance system in handling cases of acute flaccid paralysis in Korea.

CASE REPORT

A 4 month-old-male patient presenting weakness and decreased movement of the left lower extremity was transferred

to our institute. He was born from an uneventful pregnancy and delivery. He was in good health until 1 month before the visit when his parents noticed weakness of left lower extremity. He received OPV with DTaP at local health center 1 month before presenting those symptoms. Making the diagnosis in this case was somewhat delayed because his parents hesitated to seek a proper medical help initially and took him to an orthopedics clinic where he was evaluated and treated under a misdiagnosis. His family history and past medical history of perinatal period were unremarkable.

His body weight was 8.1 kg, length 66 cm, and head circumference 41.2 cm and those growth indexes measurements continued to be in the 50-90th percentile at the time of this report (2 yr old). Vital signs were not remarkable. The physical examination revealed alert mental status, and cranial nerve function tests were all normal. Neurologic examination revealed markedly decreased spontaneous movement and flaccid paralysis on the left lower extremity (GI/V) with knee jerk (+/-), biceps tendon reflex (+/+), and ankle clonus (-/-). The response to painful stimuli on the left lower extremity was markedly reduced, but there was normal in other part of his body. He had no history of intramuscular injection or trauma on the left side buttock area. Laboratory evaluation, simple skeletal radiography, hip joint sonogram, and 3-phase bone scan were all within normal ranges. Brain and spinal MRI showed no abnormalities. Electrodiagnostic evaluations showed normal sensory nerve action potentials and low amplitudes in left tibial and deep peroneal nerve.

Up to the time of this presentation, he was able to sit alone at 10 months old and walk unaided (left side heel walking) at 16 months of age. His development quotients (by Korean developmental screening test) of gross motor, fine motor, personal-social, language, and cognitive-adaptation were all 100 in each category. Bayley scales of infant showed mildly delayed performances. His upper limb diameters (mid-arm) were 7.5/7.5 cm, diameters of lower extremities were 30.5/28 cm at the mid-thigh and 22/20 cm at the mid-calf level. At the time of presentation, he had muscle weakness (GIV/V), hypotonia, and atrophy on the left lower extremity with ipsilateral claw foot (Fig. 1). Other aspects of his growth and development were excellent.

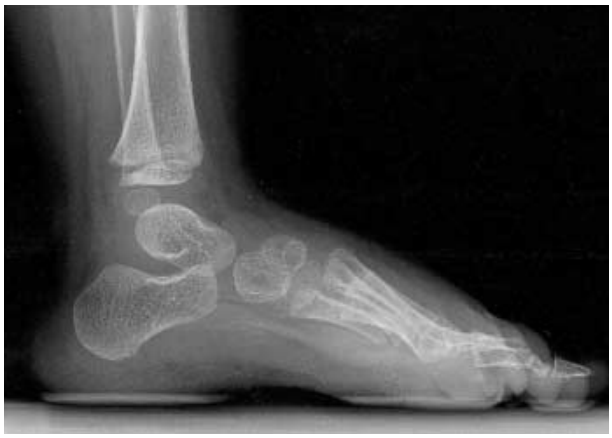

Fig. 1. Simple radiography with weight bearing showed left side claw foot deformity.

DISCUSSION

VAPP is a very rare, but well-known serious complication following the administration of OPV. It can occur among otherwise healthy OPV recipients, or healthy person who had close contact with vaccine recipients, or community contacts as well. Although there is no standard case definition for VAPP, a case of recipient VAPP is generally accepted if acute flaccid paralysis occurred 4 to 40 days after receiving OPV and residual weakness lasted for more than 60 days after the onset of paralysis. Isolation of vaccine-related poliovirus in any stool samples and no isolation of wild poliovirus from any stool samples are also generally required to confirm the VAPP cases (6). However, the isolation of vaccine-related virus is not required in making the diagnosis in some countries such as U.S.A.. VAPP cases are also be categorized as either: 1) a recipient case: the patient must have received OPV 4 to 40 days prior to the onset of illness, or 2) a contact case: the patient must have had a contact with recent OPV recipients who received immunization 4 to 75 days before the onset of illness. However, receiving OPV more than 40 days or had a contact more than 75 days prior to the onset of symptoms does not preclude classification in these categories (7). Electrophysiologic studies usually show normal sensory nerve conduction velocity, normal or reduced amplitude in compound motor action potentials, and no slowing of nerve conduction velocities. Fibrillation potentials were widespread, including in those with focal weakness (8). Currently available MRI data are limited, but Malzberg et al. (9) documented high signal intensity of anterior horn cells on T2-weighted image. Intramuscular injection may induce peripheral nerve damage. Differentiating VAPP from peripheral nerve injuries is difficult because of the similarities in their clinical findings. Therefore, recognizing an injection trauma or traumatic neuritis must be accurate to reduce the danger of VAPP cases go unnoticed (10). West Nile virus and Enterovirus 71 are also implicated in polio-like paralytic syndrome (7, 8).

In 1997, American Academy of Pediatrics (AAP) recommended a polio vaccination schedule consisting of two initial doses of IPV followed by two additional doses of OPV to prevent the VAPP. However, the incidence of VAPP had not changed significantly. At that time, AAP figured VAPP would not be eliminated unless the use of OPV was stopped. In 2000, AAP changed their policy to provide "all-IPV schedule" for routine childhood immunization (11). Recently, some countries including the U.S.A. and Germany have changed their national policies to recommend vaccination with IPV

alone instead of OPV (12). In Korea, Advisory Committee on Immunization Practices recommended using IPV either alone or together with OPV in 2002, and all IPV schedule was implemented in 2005.

In conclusion, we report a case of VAPP, which we followed for a relatively long period of time. Despite massive physical therapy provided, the patient is left with permanent hypotonic monoparesis (GIV/V) with atrophy on the left lower extremity and left side claw foot. Since we failed to isolate the causative strain in this case, we report this patient as the first clinically confirmed case of VAPP in Korea. A good AFP surveillance system as were as physicians' appropriate concerns are important in detecting poliomyelitis in the future, either wild or vaccine-related, so that we can reach the common goal of eradicating poliomyelitis.

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