Jpn. J. Infect. Dis., 67, 135-136, 2014

Laboratory and Epidemiology Communications

Vaccine-Associated Paralytic Poliomyelitis: a Case Report

Milena D. Ilic[1]* and Slobodan D. Obradovic[2]

[1]*Department of Epidemiology and* [2]*Clinic of Pediatrics, Clinical Center Kragujevac, Faculty of Medical Sciences, University of Kragujevac, Serbia*

Communicated by Takaji Wakita

(Accepted October 7, 2013)

The original target date for the global eradication of poliomyelitis was the year 2000 (1,2). In 1994, the World Health Organization (WHO) Region of the Americas was certified polio-free, followed by the WHO Western Pacific Region in 2000 and the WHO European Region in 2002. In 2013, WHO (1) predicted the global eradication of poliomyelitis by the end of 2018. Poliomyelitis can be controlled by vaccination with inactivated or attenuated orally administered poliovirus types 1 and 3 because type 2 wild poliovirus was eradicated in 1999.

The last case of indigenous wild paralytic poliomyelitis in Serbia occurred in 1996 during the last large epidemic of polio in Europe, where it was imported from neighboring Albania (3). In this poliomyelitis epidemic, a total of 26 infections and 1 death was reported from the Autonomous Province of Kosovo and Metohia among unvaccinated or incompletely vaccinated children. Thus, Serbia began implementing polio eradication strategies in 1997.

Oral poliovirus vaccine (OPV) was introduced in Serbia in 1961 and has since become a routine immunization for infants. In Serbia, children aged 3 months to 13 years receive 6 doses of OPV; in the last decade, coverage with 3 doses of OPV reached 95% (3). The important advantages of routine OPV administration include low cost, ease of administration, high efficacy, ability to induce local mucosal immunity to stop virus transmission, and high efficacy rate with herd immunity (1,4,5). A disadvantage of OPV is vaccine-associated paralytic poliomyelitis (VAPP), which is an extremely rare but serious adverse event following OPV administration. Reportedly, for every 10 million OPV doses administered, approximately 3 children will develop VAPP; hence, the global VAPP burden is in the range of 250–500 cases per year.

Although the occurrence of VAPP remains primarily a public health concern in developing countries, cases continued to be reported worldwide, including Bulgaria, Hungary, Russia, the United Kingdom, India, Brazil, Japan, Belarus, and Korea (1,2,4,5). Here, we describe a case of VAPP in post-eradication era in Serbia.

On July 24, 2007, a 4-month-old male infant with left lower extremity weakness was admitted to the Institute for Mother and Child Health Protection in Belgrade, where he was diagnosed with *paralysis extremitatis inferioris lateris sinistri* with suspected VAPP.

The patient was born from a third regular pregnancy by normal delivery (35/36 weeks gestation; birth weight, 2,950 g). The mother's second pregnancy was terminated via induced abortion. Apart from this, his family history was unremarkable. According to the current schedule of immunizations in Serbia, the child received a full set of vaccinations (BCG in the maternity ward at the Clinical Center of Kragujevac; HepBI and HepBII in a local privately-owned pediatric outpatient clinic). No adverse reactions to the vaccinations were noted and there was no evidence of immune deficiency in the child. At the end of 2nd month, the child was admitted to the pediatric clinic due to a consciousness disorder. The child did not have fever. Because of a perianal infection, cephalexin was prescribed by a pediatric surgeon. Three days later, the child was discharged in good general condition. The consciousness disorder has remained etiologicaly unclear.

Immediately after discharge from the pediatric clinic, at the age of 2 full months, the child recieved a full set of vaccines (DTcP, OPV, and ActHib) at the primary health center. On the 6th day post-vaccination, the child developed symptoms of high body temperature, irritability (uncontrollable crying), and diarrhea. The child was therefore taken to a local privately-owned pediatric outpatient clinic, where the attending physician made a diagnosis of otitis media and prescribed oral amoxicillin and cephalexin for 9 and 3 days, respectively. Because there was no improvement by the 13th day of antibiotic treatment, the patient received 3 sequential intramuscular injections of ceftriaxone (on the 18th, 19th, and 20th day after the OPV administration). On the following day, the mother noticed that her child exhibited weakness in his left leg with swelling at the injection area. A neuro-pediatrician established a diagnosis of *monoparesis extremitatis inferioris lateris sinistri* (on the 25th day after the OPV administration) and recommended physical therapy. Because of persistent diarrhea, a gastroenterologist–pediatrician prescribed Linex.

Because of persistent perianal infection, the parents took their child to be examined by a surgeon who had diagnosed perianal fistula. At this time, the pediatric surgeon suspected a case of VAPP (diagnosis: *paralysis extremitatis inferioris lateris sinistri, pes equinus sinister*); thus, the child was reffered to a national pediatric clinic for a definitive diagnosis.

The case was reported to the regional Institute of

*Corresponding author: Mailing address: Department of Epidemiology, Faculty of Medical Sciences, University of Kragujevac, S. Markovica 69, 34000 Kragujevac, Republic of Serbia. Tel/Fax: +381 34 306 800, E-mail: drmilenailic@yahoo.com

Public Health. Twenty-two days after paralysis onset, type 2 poliovirus was detected in a stool sample from the patient obtained on day 47 post-OPV administration. The intratypical differentiation confirmed by a regional reference laboratory confirmed the isolate as Sabin-like vaccine virus. Wild polioviruses and enteroviruses were absent from the patient's stool samples.

The patient's family members were epidemiologically investigated, but no case was suspected among the family or neighbors. No family member traveled in the period preceding disease onset.

A follow-up of the case after 60 days recorded that paralysis did not improve. A neurological examination and needle electromyography revealed muscle weakness of the left leg. Physical therapy and rehabilitation were thus conducted continuously over the coming months. The child began to walk at 14 months of age. At 24 months of age, the child continued to walk and run. Over a 6-year follow-up, the child's mobility continued to improve. Other aspects of his growth and development were excellent.

Implementation of OPV is causally linked with the phenomenon of the specific adverse reaction of VAPP (1,2,5). VAPP is classified as either spontaneous or provoked. Epidemiological data showed that the risk for spontaneous VAPP associated with the first OPV dose is 7–21-fold higher than the risk posed by subsequent doses among immunosufficient patients. Regional differences in the incidence of VAPP are evident worldwide; however, a plausible explanation for these differences remains elusive, although risk factors likely differ among countries.

Only 2 previous cases of simultaneous VAPP and perianal infection before polio onset have been described worldwide; a case of provoked VAPP related to a rectal abscess in an infant in the United Kingdom (6) and a case of infantile VAPP with perianal abscesses in Japan (7). Therefore, our report is only the third VAPP case to illustrate a possible association of VAPP onset with perianal infection. In Serbia, perianal infection/fistula is not a contraindication for OPV administration.

In our case, the question remains as to whether the intramuscular injections are a provoking factor or only a contributing factor in VAPP onset/development. Previously, it was noted that a major risk factor for provoked VAPP was intramuscular injection administered within 30 days after OPV administration (8). A case-control study conducted in Romania (8) reported that the number and timing of intramuscular injections was strongly associated with the risk of VAPP. Among vaccine recipients, the group at highest risk of VAPP included children who received 10 or more intramuscular injections within 30 days before the onset of paralysis. The period of greatest risk associated with injections was 0–7 days before paralysis. Provoked VAPP primarily affects the muscle groups that receive an injection.

Currently, no procedures are available to identify risk factors of adverse reactions to OPV, such as VAPP, other than those for immunodeficient patients. Some VAPP cases will probably occur despite the adoption of a sequential inactivated poliovirus vaccine (IPV)–OPV vaccination schedule (1,5). Only the exclusive use of IPV or the discontinuation of all poliovirus vaccination after achieving global poliomyelitis eradication will completely eliminate VAPP. Primarily due to limited material resources, OPV is still being used in Serbia.

Acknowledgments This work was supported by the Ministry of Education, Science and Technological Development of Republic of Serbia, through Contract No. 175042.

Conflict of interest None to declare.

REFERENCES

1. World Health Organization (WHO) (2013): The Global Polio Eradication Initiative. Executive Summary of the Polio Eradication & Endgame Strategic Plan 2013–2018. WHO Document Production Services, Geneva.
2. Nathanson, N. and Kew, O.M. (2010): From emergence to eradication: the epidemiology of poliomyelitis deconstructed. Am. J. Epidemiol., 172, 1213–1229.
3. Center for Prevention and Control of Noncommunicable Diseases (2011): Statistical Yearbook of Health of Republic of Serbia, 1991–2010. Institute of Public Health of Serbia "Dr. Milan Jovanovic Batut", Belgrade.
4. Ghendon, Y. and Robertson, S.E. (1994): Interrupting the transmission of wild polioviruses with vaccines: immunological considerations. Bull. World Health Organ., 72, 973–983.
5. Alexander, L.N., Seward, J.F., Santibanez, T.A., et al. (2004): Vaccine policy changes and epidemiology of poliomyelitis in the United States. JAMA, 292, 1696–1701.
6. Bosley, A.R., Speirs, G. and Markham, N.I. (2003): Provocation poliomyelitis: vaccine associated paralytic poliomyelitis related to a rectal abscess in an infant. J. Infect., 47, 82–84.
7. Higashigawa, M., Maegawa, K., Honma, H., et al. (2010): Vaccine-associated paralytic poliomyelitis in an infant with perianal abscesses. J. Infect. Chemother., 16, 356–359.
8. Strebel, P.M., Ion-Nedelcu, N., Baughman, A.L., et al. (1995): Intramuscular injections within 30 days of immunization with oral poliovirus vaccine—a risk factor for vaccine-associated paralytic poliomyelitis. N. Engl. J. Med., 332, 500–506.