Since the World Health Assembly endorsed a plan to completely eradicate polio in 1988, the large-scale use of the attenuated oral poliovirus vaccine (OPV) has drastically decreased the number of polio cases. However, the OPV vaccine brings rare but serious adverse consequences, especially in the Type 2 vaccine strains. Most vaccine-associated paralytic poliomyelitis (VAPP) outbreaks are associated with Type 2 polio vaccine strains, and approximately 26–31% of genetically divergent vaccine-derived polioviruses (VDPVs) cases are associated with the Type 2 component of OPV. Other than VAPP cases and VDPVs, Type 2 polio vaccine strains can also cause a variety of illnesses. To the best of our knowledge, no cases of pneumonia resulting from Type 2 polio vaccine strains have been reported. However, here we report an infant case associated with the Type 2 polio vaccine strain.

A 3-month-old male infant with no underlying diseases was admitted to Beijing Haidian Hospital on July 31, 2015, where he was diagnosed with lobular pneumonia exactly 26 days after he had received his second dose of trivalent OPV (tOPV). The infant was born from a second regular pregnancy by normal delivery (35/36 weeks gestation, birth weight: 3550 g). The infant also received two birth dose vaccinations (the Bacillus Calmette–Guerin vaccine and hepatitis B vaccine), and no adverse reactions to the vaccinations were reported. The infant had no signs of immunodeficiency. His family had no history of travel in the months before he became ill.

On July 23, 2015, 18 days after his second dose of tOPV, he developed a fever, concomitant cough, some phlegm, and his body temperature reached 40°C. An antibiotic was given by intravenous drip for 3 days in a local hospital in Anhui Province, but a low-grade fever and cough persisted until his hospitalization in Beijing Haidian Hospital. Blood tests in the Haidian Hospital revealed the following results: the total white blood cell count was $1.165 \times 10^{10}/L$ (normal range: $1.500 \times 10^{10}/L–2.000 \times 10^{10}/L$); N: 14.8%; the total platelet count was $7 \times 10^{11}/L$; and hemoglobin was 110 g/L. The laboratory tests showed that the C-reactive protein was 5.0 mg/L (normal range $\leq 10.0$ mg/L). Chest radiographs showed thickness or turbulence in the texture in both lungs and blotches of shadows in the right lung. Further clinical features were respiratory sounds and pulmonary rales. In the hospital, treatments included antibiotic therapy and respiratory management such as aerosols, suctioning, back therapy, and body positioning. He was given intravenous tazobactam sodium 1 g/d and ambroxol hydrochloride and Ge injections 15 mg/d. After 3 days of treatment, his body temperature returned to normal and his cough was mild. He was released on August 8 after his cough and pulmonary rales disappeared and after the chest films revealed significant absorption of the infected lesions. Except for the presence of the pneumonia symptoms, he had no problems with his growth and development.

A nasopharyngeal swab sample was collected at the time of admission. Total nucleic acid (RNA and DNA) was extracted from the clinical specimens using a Thermo.

Key words: Cell Culture; Pneumonia; Polio Vaccine

Access this article online

Quick Response Code:  
Website: www.cmj.org  
DOI: 10.4103/0366-6999.196575

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms. For reprints contact: reprints@medknow.com

© 2017 Chinese Medical Journal | Produced by Wolters Kluwer - Medknow

Received: 24-08-2016 Edited by: Yi Cui  
How to cite this article: Li MZ, Zhang TG, Li AH, Luo M, Jiao Y, Dong M, Gong C, Huang F. A Pneumonia Case Associated with Type 2 Polio Vaccine Strains. Chin Med J 2017;130:111-2.
Non-rhinovirus enteroviruses associated with respiratory illness in a pediatric patient vaccinated with OPV in China

A case investigation revealed that an infant had similar respiratory clinical symptoms after his second dose of tOPV. The clinical and virologic investigation revealed that respiratory illnesses were diagnosed in many patients but only the Sabin poliovirus could be detected in their respiratory tracts, suggesting that ingested OPVs spread and cause diseases beyond the gastrointestinal tract. The poliovirus caused outbreaks of human acute respiratory diseases or “minor illnesses” without clinical symptoms of the involvement of the central nervous system. A search of the database revealed that OPVs spread through the nasopharynx which is detected by serum neutralization from patients with acute respiratory infections. Notably, an epidemiological investigation found that an infant had similar respiratory clinical symptoms after each dose of tOPV. Thus, these reports, along with the case in this study, support the causal relationship between the Type 2 polio vaccine and pneumonia.

Additional studies are necessary to better understand the role of OPV in the pathogenesis of respiratory tract infections. However, this report provides an initial case of pneumonia, the outcomes associated with Type 2 polio vaccine strains, and the implications for the safety of attenuated OPV in the absence of wild virus diseases. This report also offers clinical support for the World Health Organization’s plan to eliminate the Type 2 component of OPV in 2016 by removing the tOPV and using the bivalent OPV, which contains only Type 1 and 3 components of OPV.

Financial support and sponsorship
This work was supported by grants from the Beijing Municipal Science and Technology Commission (No. Z151110003915140), the Capital Medical Development and Scientific Research Fund (No. 2016-2-3011), and the National Major Science and Technology Project for Control and Prevention of Major Infectious Diseases of China (No. 2016ZX10004206).

Conflicts of interest
There are no conflicts of interest.

References
1. Burns CC, Diop OM, Sutter RW, Kew OM. Vaccine-derived polioviruses. J Infect Dis 2014;210 Suppl 1:S283-93. doi: 10.1093/infdis/jiu295.
2. Patel M, Zipursky S, Orenstein W, Garon J, Zaffran M. Polio endgame: The global introduction of inactivated polio vaccine. Expert Rev Vaccines 2015;14:749-62. doi: 10.1586/14766058.2015.1001750.
3. Chi CY, Tseng FC, Liu DP, Chang YW, Wu HC, Huang YF, et al. Investigations of clinical isolations of oral poliovirus vaccine strains between 2000 and 2005 in Southern Taiwan. J Clin Virol 2009;45:129-34. doi: 10.1016/j.jcv.2009.03.013.
4. Opara SM, Wamunyokoli F, Khamadi S, Coldren R, Bulino WD. Genotyping of enteroviruses isolated in Kenya from pediatric patients using partial VP1 region. Springerplus 2016;5:158. doi: 10.1186/s40064-016-1834-0.
5. Huaman JL, Carrion G, Ampuero JS, Gomez J, Ocaña V, Paz I, et al. Non-rhinovirus enteroviruses associated with respiratory infections in Peru (2005-2010). Virol J 2014;11:169. doi: 10.1186/1743-422X-11-169.