Notes from the Field

Subacute Sclerosing Panencephalitis Death — Oregon, 2015

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In 2015, the Oregon Health Authority was notified of the death of a boy with subacute sclerosing panencephalitis (SSPE), a rare and fatal complication of measles. The patient, aged 14 years, had reportedly been vaccinated against measles in the Philippines at age 8 months. However, the patient contracted measles at age 1 year while still in the Philippines. He had been well until 2012, when his neurodegenerative symptoms began. After the diagnosis of SSPE was made, the patient remained in home hospice care until his death. Investigators from the Oregon Health Authority and the Oregon Health and Science University reviewed the patient's medical records and interviewed the parents. Vaccination against measles can prevent not only acute measles and its complications, but also SSPE.

Investigators learned that, in 2012, at age 11 years, the boy, who was previously healthy and developmentally normal, had been admitted to a tertiary care children's hospital in Oregon with severe, progressive encephalopathy. Before the onset of his neurologic illness, the patient had been a straight-A, fifth-grade student who played soccer and basketball. The symptoms began approximately 4 months before the hospital admission, when the patient began to struggle with homework, drop utensils, and doze off during meals, eventually progressing to falling asleep while walking. During the subsequent month, his mother reported that he was less alert and sometimes seemed confused. He experienced myoclonic jerks and involuntary hand and arm movements, which became increasingly frequent, and his coordination deteriorated. He missed 3 weeks of school and required a home tutor. His appetite decreased, and he lost 12 pounds but remained playful and interactive.

A pediatric neurologist was consulted. No family history of neurologic disease was reported. The initial evaluation included a lumbar puncture and magnetic resonance imaging of the brain, both of which were unremarkable. An electroencephalogram (EEG) was abnormal, with frequent, high-amplitude bifrontal slowing, a nonspecific finding. Despite extensive evaluation, the cause of the neurologic degeneration was not identified.

During the following month, the patient's cognitive and motor skills declined further and included the onset of repetitive behaviors, as well as inability to sit still, frequent falling, and asking seemingly meaningless questions. He became aggressive and could no longer be tutored. During the month before his hospital admission, he began to shuffle and walk on his toes; he eventually refused to walk. He cried continuously, became increasingly aggressive, and began sleeping for longer periods. Although he was responsive at that time, his speech became difficult to understand; eventually he could say only a few words. A few days before hospital admission, he experienced worsening spasticity and rapid decline in mental status; he became incontinent and was unable to eat or drink. He did not fix on or follow objects, and he no longer appeared to recognize his family members' faces or voices.

Upon admission to the hospital in 2012, he had abnormal movements of the arms and legs, was unresponsive to questions, and unable to follow commands. He withdrew to touch and pain but evidenced spasticity and marked rigidity. All immunologic studies were normal. The EEG during this admission showed moderate, diffuse background slowing and disorganization, with multiple spikes and sharp waves, characteristic of SSPE. His serum measles IgG level was markedly elevated at >11.00 index value (IV) (positive ≥1.10 IV), and his cerebrospinal fluid (CSF) measles IgG level was >10.00 IV (positive >0.89 IV). Serum measles IgM was negative. The CSF measles IgG was confirmed at CDC's measles virus laboratory (titer = 1:40,960), and a diagnosis of SSPE was made. Because no specific therapy was available, the patient was discharged after 14 days and died in home hospice care 43 months later, in 2015.

The patient's clinical characteristics, typical EEG pattern, and elevated CSF measles antibody level are all consistent with SSPE (*1*,*2*), a progressive neurodegenerative disease associated with persistent measles virus infection in the central nervous system caused by aberrant viral gene expression.* The clinical time course and features of SSPE are highly variable, and its initial symptoms can be subtle.† The disease typically develops 7–10 years after infection with measles virus (*1*).

The patient had documentation of receipt of 1 dose of measles vaccine at age 8 months in the Philippines, although the patient contracted measles at age 1 year. Whereas nothing is known about the storage conditions or potency of the vaccine administered in the Philippines, vaccination during early infancy has been associated with lower seroresponses than the seroresponses of children vaccinated later, related to interference by circulating maternal antibody (*3*). Two doses of measles-containing vaccine are routinely recommended to ensure protection against measles (*4*).

* http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/table-of-contents.pdf.
† http://indianpediatrics.net/apr1998/337.pdf.

Analysis of SSPE among persons who had measles during the 1989–1991 U.S. measles resurgence indicated an incidence of 4–11 SSPE cases per 100,000 measles cases, approximately 10 times higher than earlier estimates (*1*). Specimens for detection of viral RNA and genotyping were not available for this patient, but studies have shown that measles vaccine strains do not cause SSPE (*1*,*5*,*6*).

SSPE is a rare, long-term complication of measles. Widespread use of measles vaccine[§] has been associated with the near disappearance of SSPE in the United States. This case underscores the importance of maintaining high population immunity, through routine administration of 2 doses of measles-containing vaccine to all eligible children. The first dose should be administered at age ≥12 months, and the second dose at age 4–6 years. Infants aged 6–11 months who are traveling abroad should receive 1 dose of measles, mumps, and rubella (MMR) vaccine. Infants who receive MMR vaccine before age 12 months should be considered potentially susceptible to all three diseases and should be revaccinated with 2 doses of MMR vaccine, the first dose administered when the child is aged 12–15 months (12 months if the child remains in an area where disease risk is high) and the second dose at least 28 days later.

[§] Measles, mumps, and rubella (MMR) and measles, mumps, rubella, and varicella (MMRV) vaccines are the only measles-containing vaccines available in the United States.

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