

# Emerging invasive nonvaccine pneumococcal serotype 25

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*Streptococcus pneumoniae* (pneumococcus) is a bacterial pathogen that causes invasive infections, including septicemia and meningitis, as well as noninvasive infections such as community-acquired pneumonia, sinusitis and acute otitis media. Vaccination with pneumococcal conjugate vaccine (PCV7) has significantly reduced the burden of pneumococcal disease; however it targets only seven of the more than 92 pneumococcal serotypes. Concerns have been raised that nonvaccine serotypes could increase in prevalence and reduce the benefits of vaccination. We report one case with invasive nonvaccine serotype 25 that presented with meningitis.

**S***treptococcus pneumoniae* remains a leading cause of serious illness and death among young children worldwide. Only a limited number of the 92 known pneumococcal serotypes are responsible for the majority of pneumococcal invasive infections.<sup>1</sup> Although invasive pneumococcal disease (IPD) rates have declined following PCV7 use, nonvaccine serotypes have rapidly increased.<sup>2-4</sup> Data from the Active Bacterial Core Surveillance indicate that the overall incidence of IPD among children aged <5 years decreased from approximately 99 cases during 1998 to 1999 to 21 cases in 2008 per 100 000 population in both time periods.<sup>5</sup> Because of the need to monitor changes in serotype distribution after widespread use of PCV7, PCV10 and now PCV13, we are reporting one case which to our knowledge is the first reported invasive pneumococcal disease with serotype 25.

## CASE

Our patient was an 8-month-old female infant who had completed 3 doses of PCV-13 vaccine and who was admitted to the intensive care unit with a 2-day history of fever, lethargy, poor feeding and drowsiness. During the initial examination, she looked drowsy with a Glasgow coma scale of 13/15, and was having arching movements. Her heart rate was 130 beats/minute. Her anterior fontanel was flat and the tone was reduced in all four limbs. Otherwise, the systemic examination was unremarkable.

Cerebrospinal fluid (CSF) examination showed a red blood cell of  $2161 \times 10^6/L$  (normal reference range,  $0-10 \times 10^6/L$ ), a white cell count of  $33 \times 10^6/L$  (normal reference range,  $0-10 \times 10^6/L$ ) with polymorphonuclear neutrophils 80% (normal reference range, 0-6%), CSF glucose 0.06 mmol/L (normal reference range, 3.3-4.4 mmol/L) and protein 2.32 g/L (normal reference range, 0.15-0.4 g/L). A CT scan of the head was normal apart from the incidental finding of frontal hygroma. The infant was started on ceftriaxone, vancomycin and acyclovir. The CSF culture reported *S pneumoniae* sensitive to penicillin, ceftriaxone and cefotaxime. The blood culture was negative. The infant was continued on ceftriaxone for 2 weeks. The CSF culture repeated after 10 days was negative. The infant developed isolated left-sided ophthalmoplegia with divergent squint, but no other neurological sequelae. The *S pneumoniae* serotype was confirmed as serotype 25.

## DISCUSSION

Invasive pneumococcal disease has been reduced in the United States following conjugate vaccination (PCV7) targeting seven pneumococcal serotypes in 2000. However, an increase in IPD due to other nonvaccine serotypes has been observed.<sup>6</sup> Several studies identified different nonvaccine serotypes, but none included serotype 25. Michael et al carried a study on 1235 invasive and noninvasive isolates of *S pneumoni-*

*ae* recovered from children and adults at University Hospitals Case Medical Center, Cleveland, Ohio in the United States during the period 1999-2007. The study showed an increase in or emergence of several vaccine-related and nonvaccine serotypes, particularly serotypes 6C, 19A, and 22F and serogroup 15.<sup>7</sup> In Brazil, Leila et al described *S pneumoniae* serotype 6C which accounted for 2.3% of meningitis cases and 3.2% of nasopharyngeal isolates from healthy individuals between 1996-2007.<sup>8</sup>

Between 1995 and 2009, in a surveillance covering the whole of Poland, a study involving 1285 invasive isolates of *S pneumoniae* reported 5 cases of IPD of serotype 6D, three of whom were children.<sup>4</sup> Alvares et al reported pneumococcal strains obtained from normally sterile fluids from patients admitted with meningitis. From April 1999 to April 2009; the most commonly identified serotypes were 14, 19F, 3, 7F, 6A, 6B, 10A, 18C, 23F, 5, and 34.<sup>9</sup> In 11 165 pneumococcal strains

isolated in 113 Spanish hospitals between January 1997 and June 2001, 4 of these serotypes (11, 15, 21 and 35) were the most prevalent, and among them serotype 15 was particularly frequent with >50% of its strains resistant.<sup>10</sup> The Center for Disease Control and Prevention identified 68 cases with invasive pneumococcal serotype 35B isolates recovered between 1995-2001 from different areas in the United States.<sup>11</sup> In addition, three adult patients in Naples, Italy, had meningitis due to multiple drug-resistant serotype 24F *S pneumoniae* isolates from May 1997 through February 2000.<sup>12</sup>

There are no reported cases or published data about serotype 25 except for experimental studies. This could be because some laboratories lack the diagnostic tools to determine the serotype, so it is reported as nontypable, or it is possible that it is an emerging nonvaccine serotype. In conclusion, we need ongoing surveillance to monitor the serotypes causing invasive pneumococcal disease to make future plans for prevention.

## REFERENCES

- Weinberge DM, Malley R, Lipstich M. Serotype replacement in disease after pneumococcal vaccination. *Lancet*. 2011;378:1962-11.
- Dinleyici EC. Current status of pneumococcal vaccine: lessons to be learned and new insights. *Expert Rev Vaccines*. 2010;9:1017-1022.
- McIntosh D, Reinert RR. Global prevailing and emerging pediatric pneumococcal serotypes. *Expert Rev Vaccines*. 2011;10:109-129.
- Kuch A, Sadowy E, Skoczyn A, Hryniewicz W. First report of streptococcus pneumonia serotype 6D isolates from invasive infections. *Vaccine*. 2010;28:6406-6407.
- Centers for Disease Control and Prevention. Prevention of Pneumococcal Disease Among Infants and Children --- Use of 13-Valent Pneumococcal Conjugate Vaccine and 23-Valent Pneumococcal Polysaccharide Vaccine. *MMWR* 2010;59 (RR-11);1-18.
- Hanage WP, Finkelstein JA, Huang SS, Pelton SI, Stevenson AE, Kleinman K, Hinrichsen VL, Fraser C. Evidence that pneumococcal serotype replacement in Massachusetts following conjugate vaccination is now complete. *Epidemics*. 2010;2:80-4.
- Jacobs MR, Good CE, Bajaksouzian S, Windau AR. Emergence of streptococcus pneumonia serotypes 19A, 6C and 22F and serogroup 15 in Cleveland, Ohio, in relation to introduction of the protein-conjugated pneumococcal vaccine. *Clin Infect Dis*. 2008;47:1388-95.
- Campos LC, Carvalho MS, Beall BW, Cordeiro SM, Takahashi D, Reis MG, et al. Prevalence of streptococcus pneumonia serotype 6C among invasive and carriage isolates in metropolitan Salvador, Brazil, from 1996 to 2007. *Diagn Microbiol Infect Dis*. 2009;65:112-115.
- Alvares JR, Mantese OC, de Paula A, Wolkers PB, Almeida VP, Grassi S, et al. Prevalence of pneumococcal serotypes and resistance to antimicrobial agents in patients with meningitis: ten-year analysis. *Braz J Infect Dis*. 2011;15:22-27.
- Fenoll A, Asensio G, Jado I, Berrn S, Camacho MT, Ortega M, et al. Antimicrobial susceptibility and pneumococcal serotypes. *Journal of Antimicrobial Chemotherapy*. 2002;50: 13-19
- Fenoll A, Granizo JJ, Aguilar L, Gime-ñez MJ, Aragonese-Fenoll L, Hanquet G, Casal J, et al. Temporal trends of invasive streptococcus pneumonia serotypes and antimicrobial resistance patterns in Spain from 1979 to 2007. *Journal of clinical microbiology*. 2009;47:1012-1020.
- Pantosti A, Gherardi G, Conte M, Faella F, Dicuonzo G, Beallnovel B. Multiple drug-resistant serotype 24 F strain of streptococcus pneumonia that caused meningitis in patients in Naples, Italy. *Clin Infect Dis*. 2002;35:205-208.