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CORRESPONDENCE

Severe *Streptococcus pneumoniae* 19A pneumonia with empyema in children vaccinated with pneumococcal conjugate vaccines

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We read with great interest the article written by Ho et al[1] on breakthrough pneumococcal 19A bacteremia in a child immunized with 10-valent pneumococcal conjugate vaccine (PCV10). We believe that breakthrough infections are inevitable because the protective efficacy of a given vaccine is not 100%. We would like to share our experience in severe breakthrough *Streptococcus pneumoniae* pneumonia with empyema after vaccinations with either PCV10 or PCV13 in Taiwan.

Patient 1 was a previously healthy boy aged 2 years and 9 months, who was transferred to our hospital due to fever for 6 days and progressive dyspnea for 2 days. He had received 2 + 1 doses of PCV10 at 8 months, 9 months, and 12 months of ages. On admission, he had high fever (rectal temperature 40°C) and tachypnea (respiratory rate 40–60/min). Chest auscultation revealed crackles and a decreased breathing sound over the right upper lung field. Chest radiograph and computed tomography (CT) scan showed consolidation of the right upper lung fields and moderate right pleural fluid accumulation (Fig. 1A). The white blood cell count was 18.7 × 10^9/L (neutrophils 89%). The C-reactive protein concentration was 28.05 mg/dL (normal < 0.8 mg/dL). Debridement of the right pleural space was performed with video-assisted thoracostomy surgery (VATS). *S. pneumoniae* serotype 19A was isolated from the pleural effusion. The minimum inhibitory concentration was 4 μg/mL for penicillin. Vancomycin and cefotaxime were used for 2 weeks, and then he was put on oral levofloxacin for 1 more week. A follow-up chest radiograph at 2 weeks after admission showed a septated cavitating lesion in the right upper lung field (Fig. 1C).

Over the past few years, we have also encountered similar clinical presentations in several children aged 2–5 years who had received one dose of PCV13 catch-up vaccination after the age of 2 years. For example, Patient 2 was a boy aged 4 years and 3 months when he presented to our hospital with right lower lobe pneumonia and empyema (Fig. 1B and D); *S. pneumoniae* 19A was detected in his pleural effusion by polymerase chain reaction. Early VATS and second-line antibiotics were needed to treat these patients.

In Taiwan, invasive pneumococcal disease (IPD) is a reportable disease. In 2012 and 2013, there were 749 IPD cases and 618 IPD cases reported, respectively. Among IPD in children aged less than 5 years, 61.4% and 52.7% were caused by 19A in respective years.[2] 19A is a prevalent serotype and causes severe empyema in Taiwan.[3] Taiwan did not have nationwide PCV immunization programs until 2012, when four doses of PCV13 were provided to selected high-risk groups. Later in 2013, all children aged 2–5 years were provided with a single dose of PCV13. The program was further extended to children aged 1 year; two doses of

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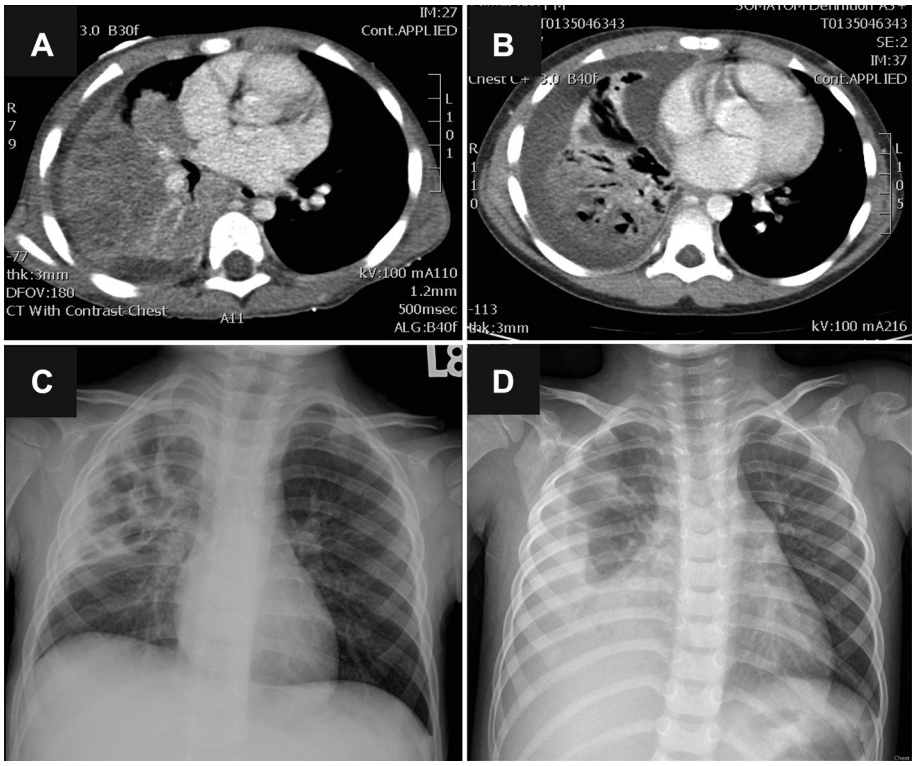

Figure 1 Chest radiographs and computed tomography scans of Patient 1 (A,C) and Patient 2 (B,D).

PCV13 have been provided to children aged 1 year since 2014.

The efficacy of PCV13 against IPD caused by new serotypes was based on a putative correlate of protection. Efficacy studies on PCV13 are not available. Postmarketing case control studies showed that one or more doses of PCV13 decreased approximately 70% of invasive pneumococcal 19A infections in the UK.[4] By contrast, a cluster randomized trial of PCV10 done in Finland showed 100% protective efficacy against 19A.[5] However, 19A is rare in Finland and there was only one 19A case in the control group. Whether PCV10 provides cross-protection against 19A remains a controversy.

We agree with Ho et al that clinicians should bear in mind that invasive 19A infections could occur in children fully immunized with PCV10. We would like to add that children receiving PCV13, especially those who receive incomplete or one-dose catch-up vaccinations, are not totally immune against 19A either. Severe breakthrough infections may occur.

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