Invasive Pneumococcal Pneumonia And Bacteremia In Thai Sibling Children: Two Cases Report

Anong Chaivisuth*

*Pediatric Department, Paholpolpayuhasena Hospital, Kanchanaburi, Thailand

We reported two cases of Thai sibling children who presented with severe invasive pneumococcal pneumonia, bacteremia and acute respiratory failure. The younger sibling had fatal outcome within 24 hours after admission. The older sibling developed severe hypertension, congestive heart failure, bilateral pleural effusion, hematuria and proteinuria concurrently with pneumonia. He had low complement 3 (C3) levels which returned to normal at 1 month follow-up visit suggestive of a good prognosis for both pulmonary and renal involvement, although microhematuria still persisted. In conclusion both children developed invasive pneumococcal infection and complicated with acute glomerulonephritis. (Thai J Pediatr 2012 ; 51 : 72-77)

Introduction

Streptococcus pneumoniae is the most common invasive bacterial infection in children and also a common cause of community acquired pneumonia, sinusitis and conjunctivitis. Transmission is from person to person, presumably by respiratory droplet contact. Overwhelming infection can be fulminating and lead to a fatal outcome. We reported two cases of Thai sibling children who developed invasive pneumococcal infection at the same time. Both of them had no risk factors for severe disease. They had pneumonia and simultaneously developed acute glomerulonephritis (AGN), a rare condition.

Cases report

Case 1: A 2 – year – old boy was admitted to a community hospital with history of fever for one day and sore throat for 2 days. He developed dyspnea one day before hospitalization. His vital signs upon admission showed temperature (T) 37.2°C, heart rate (HR) 138 beats per minute (bpm), respiratory rate (RR) 70 breaths per minute and O2 saturation (O2 Sat) 95%. He appeared ill. Chest roentgenography (CXR) confirmed haziness in bilateral hilar and perihilar regions and enlarged cardiac shadow (figure 1). Blood tests showed hemoglobin 8.4 mg/dl, 11,100 leukocytes/μl (6,882 neutrophils/μl), and 366,000 platelets/μl. Treatment was started with ceftriaxone, erythromycin, nebulized bronchodilator and hydrocortisone intravenously. During the first 24 hours (h) of admission, he developed progressive dyspnea and chest indrawing, O2 Sat 80%. He was intubated and transferred...
to the provincial hospital where advance respiratory support was available. On evaluated in the emergency department (ED), he had no HR. Cardiopulmonary resuscitation was done. He expired after 3 hours (h) in the provincial hospital. His urinalysis showed 50-100 red blood cell/high power field (RBC/HPF), 20-30 leukocytes/HPF, proteinuria 3+, and hemoglobinuria 3+.

Case 2: A 6-year-old boy was admitted to a community hospital with a history of fever, cough and dyspnea for 3 days. Pneumonia was diagnosed and confirmed by CXR that showed bilateral perihilar and lower lobe alveolar infiltration (figure 2). Treatment was started with ceftriaxone, erythromycin, nebulized bronchodilator, and hydrocortisone intravenously. On the fourth day he was transferred to the provincial hospital along with the younger sibling due to progressive dyspnea. Oseltamivir was given to him. At the emergency department, vital signs were T 37.4 °C, HR 110 bpm, RR 50 breaths per minute, BP 150/106 mmHg (> 99th percentile for age, sex and height) and O₂ Sat 98%. He appeared ill, marked dyspnea, with the crepitation at the left lower lung and wheezing at the right lower lung. CXR demonstrated infiltration and pleural effusion both lungs (figure 3). Blood tests showed hemoglobin 9.1 mg/dl, 10, 340 leukocytes/µl (7,238 neutrophils/µl), 354,000 platelets/µl and erythrocyte sedimentation rate was 17 mm/hr. The blood urea nitrogen and creatinine level were elevated at 31.4 mg/dl and 1.0mg/dl, respectively. Urinalysis showed 30-50 RBC/HPF, 10-20 leukocytes/HPF, proteinuria 2+, hemoglobinuria 3+. Conventional
real time polymerase chain reaction (RT-PCR) test for influenza was negative. The spot urine protein/creatinine ratio was 4.2. Antibiotics were changed to cefotaxime and cloxacillin.

During the first 24 h of admission he developed progressive dyspnea and O₂Sat 80%. He was placed on mechanical ventilation. Antibiotics were switched to meropenem and vancomycin. The CXR showed increased right pleural effusion.

Within the first 24 h, oligoanuria (0.2 ml/kg/h), high central venous pressure (CVP) 25 cmH₂O and congestive heart failure occurred and were treated with dobutamine, furosemide and hydralazine intravenously. On the second day, his BP remained high (BP 202/100 mmHg) with increased facial edema. Nitroglycerin infusion was started along with furosemide. The next day antistreptolysin-O (ASO) titer was done and showed negative result. The follow up CXR confirmed much decreased consolidation in both upper lobes. Two days later nitroglycerin infusion was changed to hydralazine and oral nifedipine. Rapid improvement of bilateral pleural effusion was showed on CXR. Pneumonia subsequently improved and mechanical ventilation was taken off on day eight of admission. Antibiotics were stopped after a complete 10 days of treatment. Serum complement level (C3) was below 0.3 g/l. He was discharged after 2 weeks of treatment. At the time of discharge his BP and serum creatinine were normal (0.7 mg/dl) but microhematuria and proteinuria 2+ persisted. At 1 month follow-up, his C3 level was normal (0.9 g/l) but microhematuria was still persisted.

The left over clotted blood and serum of theses 2 cases were sent to International Emerging Infections Program (IEIP), Thailand Ministry of Public Health (MOPH)-U.S. Centers for Disease Control and Prevention (CDC) Collaboration’s laboratory located at the Ministry of Public Health in Nonthaburi to perform nucleic acid extraction and PCR assay and revealed positive for *Streptococcus pneumoniae* (S. pneumoniae) which then sent to CDC Atlanta to perform confirmation test (Table). Unfortunately its serotype could not be identified due to the insufficient specimens.

**Discussion**

In Thailand, any severe pneumonia, pneumonia death of unknown etiology or cluster of pneumonia required to be reported to Bureau of Epidemiology (BOE), Thailand Ministry of Public Health (MOPH). These two cases were reported when the younger boy died. Under the severe and fatal pneumonia surveillance, physicians are encouraged to collect specimens such as blood, respiratory secretion and lung tissue in case of death. Leftover serum from the older brother, serum and heart blood collected by the attending physician from the younger brother who died a few hours after admission were sent to BOE for further investigation. In collaboration with IEIP, Thailand MOPH-

<table>
<thead>
<tr>
<th>Sample</th>
<th>Description</th>
<th>Ct Value*</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Spike</td>
<td>Positive</td>
<td>26.29</td>
<td>Positive sample</td>
</tr>
<tr>
<td>No Template Control (NTC)</td>
<td>Negative</td>
<td>&gt; 40</td>
<td>Negative sample</td>
</tr>
<tr>
<td>HN0557366 (Patient 1)</td>
<td>Blood 1</td>
<td>33.19</td>
<td>Positive for LytA gene</td>
</tr>
<tr>
<td>HN0557366 (Patient 1)</td>
<td>Serum 1</td>
<td>33.89</td>
<td>Positive for LytA gene</td>
</tr>
<tr>
<td>HN0557363 (Patient 2)</td>
<td>Blood 2</td>
<td>37.10</td>
<td>Indeterminate</td>
</tr>
<tr>
<td>HN0557363 (Patient 2)</td>
<td>Serum 2/1</td>
<td>33.35</td>
<td>Positive for LytA gene</td>
</tr>
<tr>
<td>HN0557363 (Patient 2)</td>
<td>Serum 2/2</td>
<td>35.73</td>
<td>Positive for LytA gene</td>
</tr>
</tbody>
</table>

* Ct Value: This is the cycle number at which the reaction fluorescence level crosses the background threshold level and becomes positive. For these assays, 40 reaction cycles are run. Positive results are typically seen at a Ct value of 35-36 cycles or less. Ct values of 37-39 are considered indeterminate. Ct values of 40 or above are negative.
Invasive Pneumococcal Pneumonia And Bacteremia In Thai Sibling Children: Two Cases Report

US CDC Collaboration; all specimens were performed at IEIP laboratory located in MOPH campus, Nonthaburi, Thailand. Specimens from both patients were positive for *lytA*, a gene that is restricted to *S. pneumoniae*. RT-PCR is an important diagnostic tool for evaluating serotype distribution of *S. pneumoniae* in culture-negative samples. We concluded that *S. pneumoniae* was presented in both patients.

Invasive pneumococcal disease (IPD) remains a burden and a major cause of childhood morbidity and mortality. In developed country IPD had decreased due to introduction of pneumococcal vaccination in routine immunization program. In Thailand, pneumococcal vaccine was not in the National immunization program due to expensive cost. Neither of these two patients received pneumococcal vaccination. Pneumococcal infection is one of the important causes of bacterial co-infection in patients with influenza and can increase morbidity and mortality in these patients. Our patients developed respiratory symptoms at nearly the same time, possibly due to other acute viral respiratory tract infections, not influenza A, B, or pandemic Influenza A (H1N1). Both of them could have pneumococcal colonization and clearance was inhibited by acute viral infections. Pneumococcal infection in these two patients may be drug resistant strains. Clinical course of them became rapidly progressive led to the developing of acute severe respiratory failure within 24 hours.

Abnormal urine findings were found in both patients. The older sibling developed severe hypertension, congestive heart failure, pleural effusion and AGN concurrent with pneumonia. There were several reports about pneumonia-associated AGN. The microorganism frequently reported to be the cause of pneumonia-associated AGN were *Mycoplasma pneumoniae* and *S. pneumoniae*. The reported cases were more common in adults with only a few cases described in the pediatric literature. Renal prognosis varied from a self-healing process to chronic kidney failure and occasionally required dialysis. Hypocomplementemia was a common feature of pneumonia-associated AGN, mainly through activation of the alternative pathway. Our older case had transient hypocomplementemia without evidence of *Streptococcal pyogenes* infection. We therefore considered that poststreptococcal AGN unlikely. Blood cultures from both patients were negative for *S. pneumoniae* but PCR from blood showed positive results. This may be due to early use of antibiotics at the community hospital before blood culture was taken. We should consider *S. pneumoniae* infection in a child who presents with glomerulonephritis and associated respiratory findings.

**Acknowledgments:** Thanks to Associate Professor Tawee Chotpitayansondh, Senior Medical Officer of Ministry of Public Health, Queen Sirikit National Institute of Child Health for being a consultant, Dr. Henry Kip Baggett, Dr. Somsak Thamthitiwat, Dr. Charatdao Bunthi from IEIP/CDC Nonthaburi for editing this report, Dr. Leonard Peruski from Global Disease Detection and Response Center - Central America, US CDC, Guatemala for editing the report and laboratory team from CDC, Atlanta for performing the lab test.
References


Invasive Pneumococcal Pneumonia And Bacteremia In Thai Sibling Children: Two Cases Report


