Case Report

Invasive Pneumococcal Infection in Neonates: 3 Case Reports

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Streptococcus pneumoniae is a rarely recognized cause of neonatal sepsis. We report invasive pneumococcal infection in three neonates. The infections were abrupt, severe, and rapidly progressive in two neonates with fatal outcome despite antibiotic therapy. There was no identifiable risk factor. Maternal colonization should be further studied.

Keywords: *Invasive pneumococcal disease, S. pneumoniae, Neonates*

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Streptococcus pneumoniae has been one of the leading bacterial pathogens causing illness and death among young children, elderly, and persons with underlying medical conditions[1]. It causes a wide spectrum of diseases in the form of invasive pneumococcal disease (IPD) (*e.g.* meningitis, sepsis, bacteremic pneumonia and bacteremia) and non-IPD (*e.g.* pneumonia, acute otitis media and sinusitis)[2].

The incidence of IPD was highest among children less than 2 years of age. The mean age at first colonization of *S. pneumoniae* is 6 months and carriage rates peak among children of preschool age. Carriers usually remain asymptomatic but can transmit the organism to others[3].

The common etiologic agents causing neonatal sepsis are group B *Streptococcus*, Enterococcus, *Escherichia coli*, *Klebsiella pneumoniae*, *Enterobacter spp.*, and other gram negative bacteria[4,5]. Neonatal infections due to *S. pneumoniae* have been uncommon[6]. We describe the clinical and laboratory features of IPD in three neonates, two cases from King Chulalongkorn Memorial Hospital and one case from Bhumibol Adulyadej Hospital.

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Case Report

Case 1:

A 2,800-gram-male neonate was born vaginally at a private hospital with apgar scores of 7 and 10 at 1 minute and 5 minutes, respectively. There was oligohydramnios with no history of premature rupture of membrane. No resuscitation was required. At 6 hours after birth, he developed acute respiratory distress, and a chest roentgenogram showed right pneumothorax. Intercostal drainage was performed, and cloxacillin plus cefotaxime was commenced. He developed pulmonary hemorrhage and clinically suspected necrotizing enterocolitis (NEC) on day 6 and 9 respectively. Antibiotics were changed to ceftazidime and amikacin. Despite treatment with ventilatory support he developed cyanosis. Echocardiography showed and finding compatible with persistent pulmonary hypertension of the newborn (PPHN). His hemoculture on day 12 grew *S. pneumoniae* intermediately sensitive to penicillin (MIC = 0.25 mcg/ml) and sensitive to cefotaxime (MIC = 0.125 mcg/ml). He was subsequently treated with vancomycin and imipenem without improvement, and died at the age of 1 month.

Case 2:

A 2,935 grams male neonate with apgar scores of 7 and 6 after 1 minute and 5 minutes respectively. He developed cyanosis and seizure after birth. He was intubated and ampicillin plus gentamicin was given intravenously. Chest roentgenogram showed

Table 1. Demographic, clinical and laboratory datas of pneumococcal infection in neonates

Data	Case 1	Case 2	Case 3
Birth weight (grams)	2,800	2,935	ND
Age (day), Sex	12, M	1, M	2, M
Clinical presentation	Sepsis, NEC, Pneumothorax, PPHN, Pulmonary hemorrhage	Sepsis, Pneumonia	Sepsis, Meningitis
Positive culture(s)	Blood (day 12)	Blood, Tracheal suction (day 2)	CSF (day 2)
Treatment	Ventilator Cloxacillin + Cefotaxime Ceftazidime + Amikacin Vancomycin + Imipenem	Ventilator Ampicillin + gentamicin Cefotaxime + amikacin	Ventilator High dose ampicillin
Outcome	Died	Survived	Died

infiltration at right lower lung field. Hemoculture at birth and tracheal suction culture two days after birth grew *S. pneumoniae*. After extubation, he developed aspiration pneumonia and antibiotics were changed to cefotaxime plus amikacin for 14 days. He responded well to treatment.

Case 3:

A 2-day-old male neonate developed dyspnea for 3 hours and had respiratory arrest at emergency room. On admission, he had bulging anterior frontanelle. Lumbar puncture was performed and ampicillin 200 mg/kg/day was given. He developed cardiac arrest and died at 96 hours of age. Cerebrospinal fluid (CSF) culture grew penicillin sensitive *S. pneumoniae* (PSSP).

Discussion

S. pneumoniae infections in neonate including sepsis, pneumonia, and meningitis have been relatively uncommon (2-5% of all neonatal sepsis)[6]. However these infections are associated with high morbidity and mortality. Previous reports found mortality rates varied from 20%-60%[7,8]. Most of the neonatal infections from *S. pneumoniae* were reported in single case and small series.

Most of these cases described neonates presenting in the first several days of life with invasive diseases, especially pneumonia and sepsis, and were associated with low birth weight, premature delivery, and obstetric complications[7,8]. In addition, several series described positive maternal vaginal cultures for *S. pneumoniae* and even concomitant maternal pneumococcal infections, including pneumonia, meningitis, and amnionitis[9]. In contrast to most previously published reports, there was no associated factor identified in our cases. For the case number 1, history of oligohydramnios may suggest leakage of amniotic fluid which is a risk factor for neonatal infections. A maternal swab if taken before delivery might have revealed pneumococcal colonization.

The cause of neonatal meningitis differed from that found in childhood meningitis. The study by Chotpitayasunondh in 618 Thai children with bacterial meningitis hospitalized at Children's Hospital between 1980-1990 found the very low rate of pneumococcal meningitis in neonates[10].

Our cases demonstrate the continued sporadic occurrence of pneumococcal neonatal sepsis. Clinicians should consider *S. pneumoniae* as a possible cause of fulminant sepsis in neonates. The increasing prevalence of penicillin-resistant pneumococci has been of concern. The majority of early neonatal infections were rapidly progressive and severe. The patients may die before the availability of bacteriology results. The relationship between the maternal colonized with pneumococci and neonatal infection should be explored to develop strategy of prevention and treatment in neonates.

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รายงานผู้ป่วยโรคติดเชื้อนิวโมคอคคัสชนิดแพร่กระจายในทารกแรกเกิด 3 ราย

โอฬาร พรหมาลิขิต, จุฑารัตน์ เมฆมัลลิกา, ชิษณุ พันธุ์เจริญ, อุษา ทิสยากร

เชื้อนิวโมคอคคัสสามารถก่อให้เกิดการติดเชื้อชนิดแพร่กระจายในทารกแรกเกิดได้ พบอุบัติการณ์ของการติดเชื้อในทารกแรกเกิดน้อย แต่ส่วนใหญ่ก่อให้เกิดโรคที่มีความรุนแรงมาก

รายงานผู้ป่วยโรคติดเชื้อนิวโมคอคคัสชนิดแพร่กระจายในทารกแรกเกิดจำนวน 3 ราย 2 รายจากโรงพยาบาลจุฬาลงกรณ์ และอีก 1 รายจากโรงพยาบาลภูมิพลอดุลยเดช ในจำนวนนี้เสียชีวิต 2 ราย

เนื่องจากอาจพบการติดเชื้อนิวโมคอคคัสชนิดแพร่กระจายในทารกแรกเกิดโดยทารกดังกล่าวอาจแสดงอาการของการติดเชื้อตั้งแต่หลังคลอดใหม่ๆ จึงควรอย่างยิ่งที่จะทำการศึกษาถึงความสัมพันธ์ระหว่างมารดาที่เป็นพาหะของเชื้อนิวโมคอคคัส และการติดเชื้อนี้ในทารกแรกเกิด เพื่อหามาตราการที่เหมาะสมในการรักษาและการป้องกันต่อไป