Case Report

Post Operative Penicillin-Non-susceptible *Streptococcus pneumoniae* Meningitis and Septic Shock in a Child

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The authors describe a one-year-old girl with a fronto-ethmoidal encephalomeningocele who developed wound infection, purulent meningitis and septic shock 5 hours after operation. The patient was treated with intravenous ceftazidime and vancomycin empirically. The cerebrospinal fluid (CSF) and eye discharge grew Streptococcus pneumoniae (S. pneumoniae). The minimal inhibitory concentration (MIC) by E-test of penicillin and cefotaxime were 1.0 and 0.38 ug/ml respectively so the antibiotics were switched to cefotaxime 300 mg/kg/day. She recovered completely after appropriate treatment. Penicillin-non-susceptible S. pneumoniae should be considered as one of the causes of post-operative serious infection of the face and neck in the era of increasing prevalence of penicillin-resistant S. pneumoniae.

Keywords: *Post-operative, Penicillin-non-susceptible Streptococcus pneumoniae, Meningitis*

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Streptococcus pneumoniae (*S. pneumoniae*) is one of the most common pathogens causing community-acquired meningitis in children[1], but post operative meningitis due to this organism is rare[2]. The authors report a one-year-old girl who developed post operative wound infection, meningitis and septic shock due to penicillin-non-susceptible *S. pneumoniae*.

Case Report

A one-year-old girl with a large fronto-ethmoidal encephalomeningocele (FEEM) the size of 4 x 4 x 4 cm was admitted to a surgical ward of Srinagarind Hospital, Khon Kaen University, Khon Kaen, Thailand, on May 11, 2003 for surgical correction of FEEM. She was born prematurely with a birth weight of 1.2 kilograms and at 1 year of age she weighed 6 kilograms. The operation was performed on May 12. Cefazolin 100 mg/kg/day was given intravenously at the beginning of the operation for prophylaxis. The operation was successful with total duration of five and a half hours. Intravenous cloxacillin 100 mg/kg/day in 4 divided doses was prescribed for the first 24 hours.

Five hours after operation, the patient developed vomiting, generalized convulsion and lethargy. She was in a state of shock with temperature rising from 38.4°C up to 39.5°C and a pulse rate of 160 beats/minute. There was a flap necrosis and the skin around the left eye was erythematous and swollen. Emergency computed tomography of the brain was normal. Lumbar puncture revealed turbid cerebrospinal fluid (CSF), with 2,000 white blood cell/mm^3 (neutrophils 100%), protein 147 mg/dl, sugar 66 mg/dl and blood sugar 174 mg/dl. Gram stain of CSF and pus from the left eye revealed numerous neutrophils but no organism was seen. The complete blood count showed hematocrit 32.9%, white blood cell 26,600 cells/mm^3 (82% neutrophils, 7% lymphocytes, 5% band forms, 5% monoctyes,1% eosinophils) and platelet count 243,000/mm^3.

The patient needed endotracheal tube intubation, mechanical ventilatory support, fluid

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resuscitation and anticonvulsant. Intravenous vancomycin 60 mg/kg/day in 4 divided doses and ceftazidime 150 mg/kg/day in 3 divided doses were administered to the patient empirically for presumed methicillin-resistant *Staphylococcus aureus* (MRSA) and gram-negative meningitis. The CSF and discharge from the left eye grew *S. pneumoniae* susceptible to chloramphenicol, trimethroprim-sulfamethoxazole, lincomycin but intermediate susceptible to penicillin. The minimal inhibitory concentrations (MIC) by E-test of penicillin and cefotaxime were 1.0 and 0.38 ug/ml, respectively. Seven-day post operative, ceftazidime was switched to cefotaxime 300 mg/kg/day. and vancomycin was stopped at 11-day postoperative when the patient recovered and fever resolved. Cefotaxime was given for another 5 days, therefore the total duration of antibiotic treatment was 16 days.

The patient had not been given any oral antibiotic during 3 months prior to the operation. She also did not attend a day care center. At the age of 2 years and 10 months, she was well with no neurological deficit.

Discussion

This patient underwent clean surgery of the face and cefazolin was given as prophylaxis at the time of operation according to the guidelines of the Hospital Infections Program of the Centers for Disease Control and Prevention[3]. However, she developed rapidly, progressive, severe infection of the wound and central nervous system only 5 hours after operation which led the authors to select the broadest spectrum antibiotics to cover all of the possible organisms. *Staphylococcus aureus* especially MRSA and nosocomial strains of gram negative bacteria are the common pathogens in post-operative wound infection.

There were only 2 case reports of post operative meningitis caused by penicillin-non-susceptible *S. pneumoniae* in children[2]. The operations were surgical correction of fronto-ethmoidal encephalomeningocele in a 9-month-old girl and adenotonsillectomy in a 5-year-old boy with obstructive sleep apnea. They developed meningitis 12 and 4 days after operation, respectively. In the first patient, *S. pneumoniae* was resistant to both penicillin and cefotaxime (MICs were the same level of 2.0 ug/ml) and she was treated with cefotaxime, vancomycin and rifampicin for 28 days. The patient clinically improved after 7 days of therapy and was afebrile in the second week. However, she had post meningitis complications which included hydrocephalus, seizure and abnormal movement. In the second patient, *S. pneumoniae* was intermediate susceptible to both penicillin and cefotaxime (MIC 0.75 and 1.0 ug/ml, respectively), and he was treated with both cefotaxime and vancomycin for 21 days. This patient recovered with no complications. In the presented patient, life-threatening infection developed 5 hours after operation. When the MIC test revealed that the organism was susceptible to cefotaxime, vancomycin was stopped and cefotaxime 300 mg/kg/day was continued to complete the treatment according to recommendations of the American Academy of Pediatrics for treatment of penicillin-non-susceptible *S. pneumoniae* meningitis[4] with good outcome. It is imperative that antibiotic therapy be adjusted as soon as the quantitative susceptibility test result is available in order to decrease overuse of antibiotics and to curtail emergence of antimicrobial resistance.

Including the present case, all these 3 patients underwent surgery of the face and neck, the area of the respiratory tract where *S. pneumoniae* can be a colonized organism. In one case-control study, invasive infections due to penicillin -non-susceptible *S. pneumoniae* were associated with day care attendance, prior antibiotic administration and at least one ear infection in the previous 3 months[5], but all these risk factors were not found in the presented patient. In the era of increasing prevalence of penicillin-non-susceptible *S. pneumoniae*[6,7], pediatricians and plastic surgeons should be aware of penicillin-non-susceptible *S. pneumoniae* as one of the causes of post operative wound infection of the face and neck.

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เยื่อหุ้มสมองอักเสบและเซพติกช็อกจากเชื้อ Streptococcus pneumoniae ชนิดไม่ไวต่อยาเพนนิซิลินที่เกิดขึ้นหลังผ่าตัดในเด็ก

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คณะผู้รายงานได้รายงานผู้ป่วยเด็กหญิงอายุ 1 ปี ซึ่งมารับการผ่าตัดก้อนเนื้องอกแต่กำเนิดของสมองและเยื่อหุ้มสมองที่หน้าผาก ที่โรงพยาบาลศรีนครินทร์ หลังผ่าตัด 5 ชั่วโมง ผู้ป่วยมีการติดเชื้อของแผลผ่าตัด เซพติกช็อก และเยื่อหุ้มสมองอักเสบเป็นหนอง ในเบื้องต้นผู้ป่วยได้รับการรักษาด้วย vancomycin และ ceftazidime การเพาะเชื้อจากน้ำไขสันหลังและหนองจากตาพบเชื้อ Streptococcus pneumoniae และการทดสอบความไวของเชื้อต่อยาโดยการหาระดับยาต่ำสุดที่ยับยั้งเชื้อได้ (minimal inhibitory concentration, MIC) โดยวิธี E-test พบว่า เชื้อไม่ไวต่อยาเพนนิซิลิน แต่ไวต่อยา cefotaxime (MIC 1.0 และ 0.38 ไมโครกรัม/มิลลิลิตร. ตามลำดับ) ได้เปลี่ยนยาเป็น cefotaxime 300 มิลลิกรัมต่อกิโลกรัมต่อวัน ผู้ป่วยหายเป็นปกติ เชื้อ Streptococcus pneumoniae ชนิดไม่ไวต่อยาเพนนิซิลินอาจเป็นสาเหตุหนึ่งของการติดเชื้อหลังการผ่าตัดบริเวณใบหน้าและคอได้