Inducement of Neisseria meningitidis Resistance to Ampicillin and Penicillin in a Patient with Meningococcemia Treated with High Doses of Ampicillin

Neisseria meningitidis strains with moderate or relative resistance to penicillin (defined as a penicillin MIC of 0.1–1.0 µg/mL) have decreased susceptibility to ampicillin [1] and have been reported from a wide variety of geographic locations [2–4]. Penicillin resistance in N. meningitidis is due at least in part to altered penicillin-binding protein (PBP) 2. The PBP 2 alteration results from altered nucleotide sequence of the PBP 2 gene, penA [4, 5]. High-level penicillin resistance due to β-lactamase production has also been reported, and the MICs for these N. meningitidis strains may be as high as 256 µg/mL [4].

The clinical significance of N. meningitidis with moderate penicillin resistance is still unclear. To date there are no previous reports of penicillin-susceptible N. meningitidis isolates that developed relatively moderate levels of penicillin resistance during treatment with penicillin or ampicillin. However, the development of resistance to rifampin was observed during the course of a meningococcal outbreak following prophylactic treatment with rifampin [6]. Alterations in the membrane permeability and mutations in the rpoB gene (which codes for the β subunit of RNA polymerase) are known to occur and are responsible for rifampin resistance [7]. We describe a case of meningococcemia caused by a penicillin- and ampicillin-susceptible N. meningitidis strain that developed moderate resistance to penicillin and ampicillin during therapy with high doses of ampicillin.

An 82-year-old woman presented with a 2-day history of fever, mental confusion, and shortness of breath. Physical examination revealed a sick woman in moderate respiratory distress. The temperature was 38.6°C, blood pressure, 100/70 mm Hg, and pulse rate, 110. On auscultation, subtle inspiratory crepitations were noted in the right lower lung field. The remaining findings of the physical examination were unremarkable.

Laboratory studies revealed the following values: hemoglobin, 8.4 g/dL; and WBC count, 21,000 cells/mm³ with a left shift. Lumbar puncture could not be performed because of an underlying spinal deformity. Arterial blood gas values obtained while the patient was breathing room air included a pH of 7.52, P O2 of 84 mm Hg, P CO2 of 25.1 mm Hg, and HCO 3 of 24.4 mEq/L. The patient was breathing room air included a pH of 7.52, P O2 of 84 mm Hg, P CO2 of 25.1 mm Hg, and HCO 3 of 24.4 mEq/L. On admission, cultures of two blood samples and sputum yielded N. meningitidis serogroup W-137 (Directigen; BBL Becton Dick-}

References