Septicemia Due to *Neisseria lactamica*

H. DAVID WILSON AND TIMOTHY L. OVERMAN*

Departments of Pediatrics and Pathology, University of Kentucky, College of Medicine, Lexington, Kentucky 40506, and Laboratory Service, Veterans Administration Hospital, Lexington, Kentucky 40507*

Received for publication 26 April 1976

Neisseria lactamica was isolated from the blood of a pediatric patient who had signs of septicemia and otitis media. Organisms morphologically resembling *Neisseria*, as well as gram-positive cocci, were seen on a Gram stain of fluid from the middle ear. It is hypothesized that the *N. lactamica* septicemia was secondary to infection of the middle ear by this organism.

A lactose-utilizing strain of *Neisseria* was first described in 1934 (7), but the relationship of this organism to other members of the genus was unclear for 30 years. Mitchell et al. (9) reported that some lactose-using strains were serologically indistinguishable from *Neisseria meningitidis* group B by fluorescent antibody and slide agglutination procedures. Therefore, the lactose-fermenting *Neisseria* were considered to be variants of *N. meningitidis*. The status of these organisms was resolved by biochemical and serological tests performed on a large number of lactose-fermenting strains (5). The biochemical tests showed consistent differences between the 116 lactose-fermenting isolates and those identified as *N. meningitidis*, whereas the serological tests showed only minimal cross-reactions between *N. meningitidis* and the lactose-fermenting strains. It was proposed that a new species, *N. lactamicus*, be designated for the lactose-fermenting strains. This species epithet was subsequently changed to *lactamica* to be taxonomically correct (2).

Recently, a documented case of *N. lactamica* meningitis has been reported (8). The organism was isolated from both blood and cerebrospinal fluid. This report described a case of bacteremia caused by *N. lactamica* in a pediatric patient and offers a hypothesis for blood and meningeal infection with this organism.

CASE REPORT

L.C. was a 23-month-old black female who was found lifeless in bed on 11 November 1975. The child was resuscitated and underwent tracheostomy at another hospital before transfer to the University of Kentucky Medical Center. The child was known to have a chromosomal defect with an abnormal long arm of chromosome number 1. The child's malformations included patent ductus arteriosus with pulmonary hypertension and gastrointestinal malrotation. On admission the child's body temperature was 94.6°F (34.7°C), but returned to normal during the

following 8 h. The child was obtunded and hypotensive (systolic blood pressure, 28 mm of Hg), and her abdomen was distended. The only other pertinent physical finding was an inflamed and dull right tympanic membrane. The admission complete blood count had 16,200 leukocytes/mm³ with 5% segmented neutrophils and 40% band neutrophils. The cerebrospinal fluid (CSF) contained 40 leukocytes/mm³, 20 erythrocytes/mm³, with a protein content of 40 mg/100 ml and a glucose concentration of 98 mg/100 ml. No microorganisms were seen on Gram stain of the CSF. The child was given ventilatory support and treated with ampicillin and chloramphenicol for meningitis and suspected sepsis. The child's condition slowly improved over 48 to 72 h. Ampicillin treatment was continued for a total of 12 days, but chloramphenicol was discontinued after 3 days.

The day after admission a myringotomy with tympanocentesis of the inflamed right tympanic membrane was performed in an attempt to culture all sites of possible bacterial infection. Smears of the purulent material revealed gram-positive cocci and both intracellular and extracellular gram-negative, "coffee bean"-shaped diplococci. Cultures of this material grew only alpha-hemolytic organisms which were optochin sensitive and presumed to be pneumococci.

Repeat examination of the CSF on the day after admission showed a normal cell count and no microorganisms on Gram stain. Both CSF cultures were sterile. However, the blood culture obtained on admission grew *N. lactamica*.

MICROBIOLOGICAL STUDIES

Blood cultures are processed in a manner similar to that proposed in the ASM Cumitech 1 (1). A vented bottle of brain heart infusion broth and an unvented bottle of thioglycolate broth are used. Each bottle is examined visually every day, and "blind" aerobic and anaerobic subcultures and Gram stains are performed at 24 h, 72 h, and 7 days. The *Neisseria* organism was isolated on 72-h aerobic subculture from brain heart infusion only. The 24-h subculture of brain heart infusion and thioglyco-

late were negative, and no organisms were seen on the 24- and 72-h Gram stains.

The organism was identified as *N. lactamica* on the basis of its gram-negative diplococcal morphology and biochemical characteristics. Acid was produced in tubes of cystine tryptic agar supplemented with 1% glucose, 1% maltose, and 1% lactose, but not in tubes of cystine tryptic agar supplemented with 1% sucrose. The oxidase test was positive. Cystine tryptic agar sugar fermentations were performed a total of five times. Quality control checks of the differential media with known *Neisseria* isolates, including *N. lactamica*, indicated that all the media were functioning properly.

The optochin-sensitive alpha-hemolytic gram-positive cocci, presumed to be pneumococci, were subjected to typing by counterimmunoelectrophoresis (3). However, this organism was nontypable using omniseria, a polyvalent pneumococcal antiserum reactive against 83 types, and individual antiserum for types 1, 3, 4, 6 to 9, 12, 14, 18, 19, and 23. The antisera used were all obtained from Statens Serum Institut, Copenhagen, Denmark.

DISCUSSION

N. lactamica resides in the nasopharynx (4, 5, 10) and carriage is more prevalent in children than in adults (6). The clinical significance of *N. lactamica* has not yet been established, but it is apparently less pathogenic than *N. meningitidis*, thus requiring differentiation of these two species (4, 5, 8, 10). *N. lactamica* has been implicated as a causative agent of pharyngitis (4) and meningitis (5, 6, 8).

The findings in this case suggest that *N. lactamica* may be involved in several disease processes in children. Our patient and the pediatric patient recently described with *N. lactamica* meningitis had signs of otitis media (8). A Gram stain of purulent material from behind the tympanic membrane of our patient revealed organisms morphologically resembling *Neisseria*, which may have been *N. lactamica*. However, the organism was not grown in cul-

ture, possibly due to the antibiotic therapy that had been started hours before the myringotomy was performed. *N. lactamica* may have also caused the otitis media in the previously reported case of meningitis, but middle ear fluid was not cultured. Since the carriage rate of *N. lactamica* is highest in the 3-month to 6-year age group (6), this organism might be an infrequent cause of otitis media in children. This would be undetected in the absence of middle ear cultures and would be expected to respond to penicillin therapy. We hypothesize that more serious infections such as septicemia and meningitis due to *N. lactamica* result from a focus of infection in the upper respiratory tract. Circumstantial evidence in our case and that of Lauer and Fisher (8) suggests the middle ear is the initial site of infection.

LITERATURE CITED

1. Barlett, R. C., P. D. Ellner, and J. A. Washington II. 1974. Cumitech 1. Blood cultures. American Society for Microbiology, Washington, D.C.
2. Catlin, B. W. 1971. Report (1966-1970) of the Subcommittee on the Taxonomy of the *Neisseriaceae* to the International Committee of Nomenclature of Bacteria. Int. J. Syst. Bacteriol. 21:154-155.
3. Coonrod, J. D., and M. W. Rytel. 1973. Detection of type-specific pneumococcal antigens by counterimmunoelectrophoresis. I. Methodology and immunologic properties of pneumococcal antigens. J. Lab. Clin. Med. 81:770-777.
4. Fisher, L. S., P. Edelstein, and L. B. Guze. 1975. *Neisseria lactamica* pharyngitis. J. Am. Med. Assoc. 233:22.
5. Hollis, D. G., G. L. Wiggins, and R. E. Weaver. 1969. *Neisseria lactamica* sp. n., a lactose-fermenting species resembling *Neisseria meningitidis*. Appl. Microbiol. 17:71-77.
6. Hollis, D. G., G. L. Wiggins, R. E. Weaver, and J. H. Schubert. 1970. Current status of lactose-fermenting *Neisseria*. Ann. N.Y. Acad. Sci. 174:444-449.
7. Jessen, J. 1934. Studien über gram-negative Kokken. Zentralbl. Bakteriol. Parasitenkd. Infektionskr. Hyg. Abt. I Orig. 113:75-88.
8. Lauer, B. A., and C. E. Fisher. 1976. *Neisseria lactamica* meningitis. Am. J. Dis. Child. 130:198-199.
9. Mitchell, M. S., D. L. Rhoden, and E. O. King. 1965. Lactose-fermenting organisms resembling *Neisseria meningitidis*. J. Bacteriol. 90:560.
10. Pykett, A. H. 1973. Isolation of *Neisseria lactamica* from the nasopharynx. J. Clin. Pathol. 26:399-400.