

## Meningitis Caused by *Neisseria meningitidis* Serogroup 135

MARTIN B. KLEIMAN,<sup>1\*</sup> JANET REYNOLDS,<sup>2</sup> JEANNE STEINFELD,<sup>2</sup> STEPHEN D. ALLEN,<sup>2</sup> AND JAMES W. SMITH<sup>2</sup>

*Department of Pediatrics, Section of Infectious Disease<sup>1</sup> and the Department of Clinical Pathology,<sup>2</sup> Indiana University School of Medicine, Indianapolis, Indiana 46202*

Received for publication 14 July 1978

The first descriptions of meningitis in childhood caused by *Neisseria meningitidis* serogroup 135 are presented. Difficulties with identification of unusual serogroups of *N. meningitidis* are discussed.

The spectrum and severity of disease due to unusual serogroups of *Neisseria meningitidis* are incompletely studied. We have recently seen two siblings who presented at the same visit with meningitis due to *N. meningitidis* serogroup 135. To our knowledge, these are the only reported instances of childhood meningococcal meningitis caused by this serogroup.

### CASE REPORTS

**Patient 1.** A 15-year-old white male was seen by his physician after 48 h of fever, vomiting, and malaise. Despite two doses of intramuscular penicillin within 24 h, he became disoriented and was referred to Riley Children's Hospital. Examination revealed a febrile adolescent with marked nuchal rigidity and scattered petechiae. Cerebrospinal fluid (CSF) contained 12,700 leukocytes per mm<sup>3</sup> with 98% polymorphonuclear cells and 2% mononuclear cells. CSF glucose was 3 mg/dl, and protein was 730 mg/dl. Counter-immunoelectrophoresis (CIE) of the CSF, using antisera to *N. meningitidis* serogroups A, B, C, D, X, Y, and Z (Burroughs Wellcome Co.), was negative. *N. meningitidis* was cultured from the specimen, but the isolate could not be grouped by agglutination or by CIE using antisera to serogroups A, B, C, D, X, Y, and Z by either our laboratory or the Indiana State Board of Health laboratory. The organism was referred to the Center for Disease Control, which identified it as serogroup 135.

Rapid improvement occurred during 10 days of intravenous penicillin (300,000 U/kg per 24 h), and he was completely well at the time of discharge.

**Patient 2.** The 12-year-old sibling of patient no. 1 was seen at the same visit with fever of 3-days duration, malaise, and neck pain. Improvement had not occurred after intramuscular penicillin 1 day previously. Examination revealed fever, disorientation, and marked nuchal rigidity. The CSF contained 2,767 leukocytes per

mm<sup>3</sup>, and with 86% polymorphonuclear cells and 14% mononuclear cells. Gram-negative diplococci were seen on smear, and treatment was begun with intravenous penicillin (300,000 U/kg per 24 h). Rapid improvement occurred. Left hip and knee arthritis developed during day 3 of treatment and resolved spontaneously.

Examination of the CSF by CIE and by culture showed results identical to those in patient 1. This isolate was also identified as *N. meningitidis* serogroup 135 by the Center for Disease Control. Recovery was complete. Household contacts were given rifampin prophylaxis at the time of diagnosis. Cultures of household contacts were not performed.

*N. meningitidis* serogroup 135 was initially reported in 3 of 843 isolates from individuals with systemic meningococcal infection treated by U.S. Army medical units from 1964 through 1967 (3). The Meningococcal Disease Surveillance Group of the Center for Disease Control has since reported (2) that 95% of endemic meningococcal disease in the United States is caused by groups B, C, and Y, and 2% is caused by group A organisms. Only 3% of meningococcal disease is caused by the unusual serogroups, which include 135, X, Z, and 29E.

The first report of childhood infection with group 135 organisms appeared recently and described three infants, two with bacteremia and one with septic arthritis (4). None had associated meningitis. The present cases document central nervous system infection in children and also the rare occurrence (2) of coprimary infection with an unusual serogroup.

The clinical spectrum and severity of invasive disease due to the unusual meningococcal serogroups is poorly documented, although it is felt to be similar to the more common serogroups (personal communication, Harry Feldman). Thus, a respiratory focus of infection, presumably nasopharyngeal, results in bacteremia which may then lead to metastatic infection of

the meninges, joints, pericardium, or other sites.

Standard techniques for the identification of meningococcal isolates as performed in most clinical laboratories are well described (1). The use of CIE is useful in the rapid presumptive identification of meningococci in CSF specimens especially if the patient has already been given antibiotics (1, 5, 6). However, antisera commonly used in CIE by diagnostic laboratories will not detect the unusual serogroups. In addition, the antisera commonly used to serogroup isolates will not group these isolates. Clinical laboratories should remain alert to these problems. Isolates that are not groupable with the unusual antisera should be referred to reference laboratories for further identification.

Antimicrobial susceptibility of common serogroups of *N. meningitidis* may be estimated based on rapid serogroup diagnosis by CIE (6). However, for uncommon serogroups, antimicrobial susceptibility patterns are not well studied, and antisera to these serogroups are not widely used in CIE. The isolates in the present cases were susceptible to penicillin (minimum inhibitory concentration 0.12  $\mu\text{g/ml}$ ), sulfadiazine (1.0  $\mu\text{g/ml}$ ), and rifampin (0.06  $\mu\text{g/ml}$ ). Therefore, prophylaxis of intimate contacts with either

sulfa or rifampin should have been effective in preventing secondary cases (2).

Careful attention to serogrouping meningococcal isolates will help define the incidence, clinical spectrum, and epidemiology of disease caused by unusual meningococcal groups.

#### LITERATURE CITED

1. **Catlin, B. W.** 1974. *Neisseria meningitidis* (meningococcus), p. 116-123. In E. H. Lennette, E. H. Spaulding, and J. P. Truant (ed.), *Manual of Clinical Microbiology*, 2nd ed. American Society for Microbiology, Washington, D.C.
2. **Center for Disease Control.** 1976. Analysis of endemic meningococcal disease by serogroup and evaluation of chemoprophylaxis. *J. Infect. Dis.* **134**:201-204.
3. **Evans, J. R., M. S. Artenstein, and D. H. Hunter.** 1968. Prevalence of meningococcal serogroups and description of three new groups. *Am. J. Epidemiol.* **87**:643-646.
4. **Hammerschlag, M. R., and R. S. Baltimore.** 1978. Infections in children due to *Neisseria meningitidis* serogroup 135. *J. Pediatr.* **92**:503-504.
5. **Higashi, G. I., J. E. Sippel, N. I. Girgis, and A. Hassan.** 1974. Counter immunoelectrophoresis: an adjunct to bacterial culture in the diagnosis of meningococcal meningitis. *Scand. J. Infect. Dis.* **6**:233-235.
6. **Pickering, L. K.** 1976. Chemoprophylaxis against *Neisseria meningitidis*. The role of counter-current immunoelectrophoresis. *J. Am. Med. Assoc.* **236**:1882-1883.