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SCIENTIFIC ARTICLE

A Clustering of Childhood Meningococcal Disease: A Challenge for Physicians, Press and Community

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"It commences suddenly with prostration of strength, often extreme; the face is distorted, the pulse feeble. There appears a violent pain in the head, especially over the forehead; then there comes pain of the heart or vomiting of greenish material, stiffness of the spine, and in infants, convulsions. In cases which were fatal, loss of consciousness occurred. The course of the disease is very rapid, termination by death or by cure. In most of the patients who died in 24 hours or a little after, the body is covered with purple spots at the moment of death or a very little time afterward."

— Dr. Gaspard Vieusseux, Geneva, 1805

The Delaware Division of Public Health reported only two cases of documented meningococcal infection in the pediatric population in 1992. As of March 1, 1993, the Morbidity and Mortality Weekly Report indicated only one case of meningococcal disease in the state of Delaware for 1993. However, from the end of February to early April 1993, approximately six weeks, there were seven cases of documented meningococcal infection in the pediatric population that either presented or were transferred to one of the pediatric care facilities in the Wilmington, Delaware area. Notification of these cases to the Delaware Division of Public Health prompted the dispersion of a statewide letter concerning the recognition of the clinical signs of meningitis and the proper prophylaxis for meningococcal exposure.

We have analyzed these cases and present them to illustrate the spectrum of meningococcal disease and to remind the medical community of the importance of not only recognizing, but also reporting, patients with meningococcal infection. Timely reporting of cases of this infectious disease may result in a more measured response by the medical and lay communities.

Methods

The seven cases were gathered during clinical consultations and by surveying area hospital microbiology laboratories for recent blood and cerebrospinal fluid (CSF) isolates of *Neisseria meningitidus*. Hospital records of infected patients were reviewed and data was collected with particular regard to signs and symptoms, laboratory data, serogroup of meningococcus, clinical complications and outcome.

Results

The clinical characteristics of the patients, laboratory findings and their outcomes are summarized in Table 1. The list of presenting findings is derived from Stiehm and Damrosch,[1] reflecting those characteristics which have been associated with a poor prognosis. Patient 1 had several unusual complications of his meningococcal infection, including cutaneous vasculitis, pericarditis and polyarticular arthritis; his chest radiograph is shown in Figure 1.

Discussion

Meningococcal meningitis was first described by Vieusseux in Geneva in 1805 and the organism was first isolated from spinal fluid by Weichselbaum in 1887. In the years following

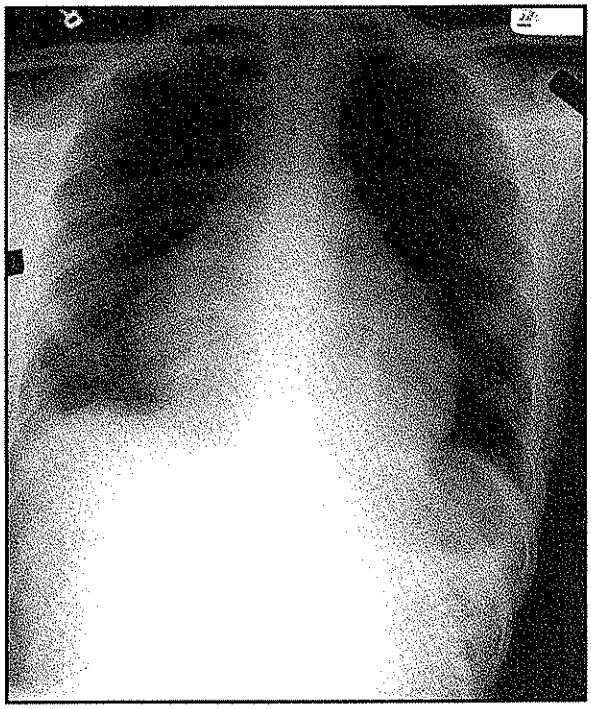

Figure 1. Chest radiograph from Patient 1, demonstrating large pericardial effusion; this eventually resolved with anti-inflammatory therapy.

these discoveries, meningococcus has caused both endemic and epidemic disease worldwide. In the United States, it causes approximately 3,000 cases per year. In 1986, the incidence of meningococcal disease was 1.3 per 100,000,[2] but recent analyses indicate a rate of 0.9 per 100,000 in the early 1990s.[3] Children, particularly infants less than one year of age, have the highest frequency of both meningitic and nonmeningitic disease. The case fatality rate of 5 to 10 percent has changed little over the past 30 years.[4]

In temperate climates, meningococcal disease has a peak incidence in the winter months. Epidemiologic studies have shown that the incidence of meningococcal disease is increased following an epidemic of influenza.[5] Significantly, there was influenza disease activity in Delaware in the months prior to and during the occurrence of the cases presented. Physicians should be aware of the association between influenza and meningococcal disease activity in order to anticipate and rapidly identify cases of meningococcal infection.

Neisseria meningitidis is a gram-negative diplococcus, is oxidase and catalase positive, and is nonmotile. It is an aerobic organism but can be a facultative anaerobe. It grows best on chocolate or blood agar with increased CO_2 tension. Meningococci can be divided into serogroups A, B, C, D, X, Y, Z, 29E and W135 on the basis of capsular polysaccharides associated with meningococcus.[6] Serogroups B and C continue to be the most prevalent groups causing serious disease in the United States.

Meningococcal infection encompasses a spectrum of presentations and severity, ranging from an asymptomatic transient bacteremia which clears spontaneously to a fulminating disease resulting in death only a few hours after the first symptoms appear. Signs and symptoms of infection often include evidence of an upper respiratory tract infection, such as coryza, pharyngitis, tonsillitis, or laryngitis. Patients are generally febrile, often with complaints of headache, lethargy, and vomiting. On physical examination, meningeal signs may be present. Other findings include fever, rash, and, in serious cases, signs of circulatory collapse. Classically, meningococcemia is associated with petechiae, though skin findings range from diffuse mottling to extensive purpura.

Surveillance data have documented a recent increase in the incidence of group C disease.[2,3] A study from Los Angeles, in which higher rates of group C meningococcal disease were noted, also found an increase in the occurrence of immune-mediated complications, including arthritis, associated with group C infection.[7] Two adolescents in the present series, both infected with serogroup C meningococcus, demonstrated such complications. The arthritis and skin lesions are frequently troublesome; pericarditis is potentially dangerous.

Proper management of meningococcal infections requires early recognition, prompt initiation of antibiotic therapy, appropriate monitoring of vital organ system function, and aggressive treatment of shock and organ system failure. The infection, however, is at times so overwhelming that even prompt medical care cannot reverse the course

PEDIATRIC MENINGOCOCCAL INFECTION IN DELAWARE							
Pt	Age	Presenting findings *	CSF WBC	Serogroup	+ Culture and/or antigen detection	Outcome	Compli-cations
1	17 yrs.	d,f,h,j,m	21,000	C	Blood, CSF, CSF latex	survived	E. nodosum, pericarditis, arthritis
2	5 mos.	e,m	Not done	B	Blood	survived	none
3	3 yrs.	e,g,n	20,450	Not done	CSF	survived	none
4	26 days	c,d,e,m	14	C,W135	CSF latex	survived	none
5	2 mos.	a,b,d,e,f,g,h i,j,k,l,n	1	Not done	Blood, CSF	expired	death
6	18 yrs.	a,b,f,h,i, j,k,n	3900	C,W135	Blood, CSF and Urine latex	survived	arthritis
7	15 yrs.	a,b,e,h,i,k, m,n	Not done	C,W135	Blood	expired	death

*Key: (from Stiehm and Damrosch[1])

a. petechiae for < 12 hours
b. shock (systolic BP < 70 mm Hg)
c. CSF WBC < 20/mm^3
d. periph. WBC < 10,000/mm^3
e. temperature > 39^0 C
f. platelets < 100,000/mm^3
g. purpura
h. coaglopathy
i. stupor or coma
j. myocardial dysfunction
k. acidosis
l. hyperkalemia
m. absence of meningismus
n. abnormal periph. perfusion

Table 1. Summary of children with meningoccal disease in Delaware, late winter 1992 to early spring 1993.

of the disease. In our patients, as is reported in the literature, certain signs and symptoms were indicators of severe disease and impending organ damage, especially petechiae less than 12 hours, shock, stupor or coma, coagulopathy, acidosis, and abnormal peripheral perfusion. Of the three patients with all these symptoms, two expired, in spite of aggressive management.

It is important to note that, while the occurrence of these cases in a six-week period may appear striking, it does not represent an in-

crease in the incidence of meningococcal infection in Delaware (which is approximately equal to the national incidence). The apparent clustering of cases was undoubtedly due in part to the level of influenza activity in the region. It is possible, though, that the community learned of these cases in a fashion which likened them to an epidemic; physician delays in reporting of cases over the six-week period may have been partly responsible. In Ontario and British Columbia during December 1991 and January 1992, after three teenagers in Ontario died of meningococcal meningitis within days of each other, the media at times referred to the cases as an "epidemic"[8].Community pressures led to a mass-vaccination program in which approximately 500,000 people were vaccinated at a cost of $4 to $5 million.[9] Considerable debate followed concerning whether the media, while informing the public, added to the anxiety of the community, and whether or not the mass-immunization was justified.

The present report should remind physicians of the occurrence and features of meningococcal infection, its temporal relationship to influenza disease activity, and should underscore the importance of timely reporting of cases to the Division of Public Health. This will facilitate earlier identification of contact cases and help give physicians, educators and the media time for proper preparation and education of the community.

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