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Meningococcal Meningitis Fact Sheet

Meningococcal meningitis

Meningitis is an infection of the meninges, the thin lining that surrounds the brain and the spinal cord. Several different bacteria can cause meningitis and Neisseria meningitidis is one of the most important causative agents because of its potential to cause epidemics.

There are two main forms of clinical manifestation of the disease; meningococcal meningitis, which has a good prognosis if it is adequately treated and meningococcemia or *Meningococcal septicemia*, which is less frequent and highly lethal even when treated. It is characterized by positive blood cultures and an exaggerated systemic inflammatory response, associated with endotoxemia. Cases of simultaneous meningitis and bacteremia are generally considered as cases of meningitis. *Meningococcal septicemia* is considered a medical emergency and can result in death rapidly.

Causative organism

Meningococcal disease is caused by the gram-negative bacterium *Neisseria meningi-tidis*, also known as meningococcus. Twelve subtypes or serogroups of N. meningitidis have been identified and four (N. meningitidis. A, B, C and W135) are recognized to cause epidemics. The pathogenicity, immunogenicity, and epidemic capabilities differ according to the serogroup. Thus the identification of the serogroup responsible for a sporadic case is crucial for epidemic containment.

The impact of the disease persists due to the lack of effective control measures necessary to significantly decrease the number of asymptomatic carriers. For every case of meningococcal disease there are hundreds of persons in normal conditions with upper respiratory tract colonization. Humans are the only reservoir in nature.

Mode of transmission

Transmission results from person-to-person contact or from inhalation of respiratory droplets containing meningo-cocci. It does not survive in the environment or in animals. Coughing and sneezing contribute to the transmission mechanism . The carrier rate is low during childhood and high in adolescents and young adults. Transmission is relatively slow in open populations and is greater in isolated populations and is aggravated by smoking or respiratory infections.

Pathogenesis

Most subjects colonized by *N. meningitidis* remain asymptomatic. However, a lower percentage of meningococci enters the mucosa and the circulatory system, causing systemic disease.

Incubation Period

The average incubation period is 4 days, ranging between 2 - 10 days.

Clinical Features

The most common symptoms are stiff neck, high fever, sensitivity to light, confusion, headaches and vomiting. Even when the disease is diagnosed early and adequate therapy

instituted, 5% to 10% of patients die, typically within 24-48 hours of onset of symptoms. Bacterial meningitis may result in brain damage, hearing loss, or learning disability in 10 to 20% of survivors. A less common but more severe (often fatal) form of meningococcal disease is meningococcal septicaemia which is characterized by haemorrhagic rash and rapid circulatory collapse.

Laboratory Diagnosis

Diagnosis of meningococcal meningitis is based upon analysis of cerebrospinal fluid .
Cerebrospinal Fluid Characteristics in Meningococcal meningitis

Macroscopic characteristics: murky or purulent.	
WBC count:	>1000 cells/mm3 with over 80% polymorphonuclears.
Proteins:	>80 g/L
Glucose:	<0.4 g/L
Gram stain:	Gram negative intracellular diplococci in 80% of untreated cases.

The adequate medium is Mueller-Hinton or GC enriched with supplement, which have replaced agar chocolate medium. Gram stain of the cerebrospinal fluid is an important test for prompt and accurate identification of *N. meningitidis*.

Commercial kits available to detect the polysaccharide antigen in cerebrospinal fluid are also very useful for preliminary diagnosis of meningococcal disease, including sero-group identification. False negative results may occur, particularly when serogroup B is involved.

Currently, testing is performed with the polymerase chain reaction (PCR) in cerebrospinal samples, to identify the sero-group, with the advantage of not requiring live organisms to perform the test with a sensitivity and specificity greater than 90%.

When severe purpura occurs, it is usually associated with systemic intravascular coagulation. Blood cultures are frequently positive. When purpuric lesions occur, direct microscopic observation and culture of tissue specimens or pus may provide diagnosis .

Treatment

Meningococcal disease is potentially fatal and should always be viewed as a medical emergency. Admission to a hospital or health centre is necessary. Isolation of the patient is not necessary. Antimicrobial therapy must be commenced as soon as possible after the lumbar puncture has been carried out.

A range of antibiotics may be used for treatment including penicillin, ampicillin, chloramphenicol, and ceftriaxone.

Control and prevention measures

Meningococcal disease is potentially preventable by vaccination and chemoprophylaxis under specific circumstances. In some countries with high endemic rates of meningococcal disease vaccines against it are included within universal vaccination programmes.

Vaccination

Preventive vaccination can be used to protect individuals at risk (e.g. travellers, military, pilgrims). Meningococcal polysaccharide vaccines are effective for outbreak control and prevention among high risk groups, such as travellers to countries where the disease is epidemic, Hajj pilgrims and individuals with underlying immune dysfunctions.

Chemoprophylaxis

The purpose of chemoprophylaxis is to prevent the occurrence of secondary cases by eliminating carriers with *Neisseria menin-gitidis*. Chemoprophylaxis is an important control measure; however, it has limited effectiveness and its use should be restricted to special circumstances. These circumstances include close contacts of cases, such as institutionalized subjects, those who share quarters (households, schools, military stations, jails, and nurseries), as well as subjects who have been in contact with oral fluids of patients, either by kissing or by sharing food or beverages.

Patients with meningococcal infection treated in a hospital or clinic, who has received an antibiotic, which does not eliminate the carrier state (penicillins or chloramphenicol), should receive chemo-prophylaxis with an effective antibiotic (ciprofloxacin, rifampicin, or ceftriaxone) upon hospital discharge.

Massive chemo-prophylaxis is not recommended by any health authority during outbreaks. Since the risk of secondary cases among close contacts of the index case is very high during the first day of infection, chemoprophylaxis should be started early, preferably within 24 hours from initial contact. Secondary cases usually occur within 10 days after exposure. Close observation of this group of subjects is recommended for at least 10 days to ensure administration of appropriate and timely therapy of secondary cases, which may occur even in the presence of adequate chemo-prophylaxis.

Among potentially useful Chemoprophylaxis antibiotics, the most frequently used is rifampicin. Nevertheless, utilization of oral ciprofloxacin as a single dose is a useful alternative, since in addition to easier adherence it is as effective as rifampicin. Rifampicin use has some disadvantages; it is the main drug for tuberculosis control and its excessive utilization may result in un-acceptably high rates of microbial resistance. Utilization of ciprofloxacin in childhood, particularly when given as a single dose, has not been associated with toxicity. This makes it suitable for chemoprophylaxis in children.

Chemoprophylaxis Schemes Against Meningococcal Disease

Drug	Age Group	Dose
Ciprofloxacin		20mg/kg, single dose
	Adult	500 mg single dose
Rifampicin	< 1 month	5 mg/kg, twice a day for 2 days
	> 1 month	10 mg/kg, twice a day for 2 days
	Adults	600 mg single dose
Ceftriaxone	< 15 years	125 mg, single dose, intramuscularly
	> 15 years	250 mg, single dose, intramuscularly

Travellers' health information

Travellers to areas affected by meningococcal outbreaks are advised to be vaccinated. For pilgrims to the Hajj and Ramadan Omra, Saudi Arabia requires visitors obtain a tetravalent vaccine (against A, C, Y, W135) at least ten days prior to their arrival in the country.