Two Cases of Meningococcal Sepsis
Caused By Neisseria Meningitidis Serogroup B

Liliya Pekova, Pavlina Parousheva, Grozdanka Lazarova, Julian Ananiev

1Clinic of Infectious diseases, University Hospital, 2Deptm. of Infectious Diseases, Medical Faculty, Trakia University, 3Deptm. of Clinical Microbiology, Medical Faculty, Trakia University, 4Deptm. of Pathology, Forensic medicine and Deontology, Medical Faculty, Trakia University, Stara Zagora

Abstract

Thirteen serogroups of bacterium Neisseria meningitidis (N. meningitidis) have been identified, but 5 of them - A, B, C, W-135 and Y - are responsible for majority of the infections worldwide. Serogroup B meningococcus is uncommon in Bulgaria. In 2014 two cases of meningococcal sepsis caused by N. meningitidis serogroup B were diagnosed and treated in the Clinic of Infectious Diseases of University Hospital of Stara Zagora, Bulgaria. They were 10-months old female and 1-year old male. The diagnosis was based on the clinical, epidemiological, laboratorial, microbiological and molecular-genetic analysis. Both cases presented with a sudden onset of fever, marked asthenia, refusing feeds and hemorrhagic-necrotic skin rash. In the first case the disease evolved to meningococcal sepsis with meningitis with a favorable outcome. The second case rapidly developed fulminant meningococcal sepsis without meningitis with a lethal outcome. In both cases N. meningitidis serogroup B as etiological agent was confirmed.

Keywords

Meningococcal Sepsis; Neisseria Meningitidis Serogroup B; Suckling
Address for correspondence

Introduction: Majority of cases of Meningococcal disease occur during the winter and early spring. The rate of this anthroposiosis is high among sucking, infants, adolescents and young adults [1]. Neisseria meningitidis (N. meningitidis) is a Gram-negative aerobic diplococcus divided into 13 serogroups. Serogroups A, B, C and W-135 are responsible for over 99 percent of cases. According to the data of WHO approximately 20 000-80 000 cases of Meningococcal disease serogroup B occur annually in the world with case-fatality rate about 10 percent despite treatment and optimal medical care [2]. Around 10-20% of cases N. meningitidis gain access to the blood stream causing meningococcemia. [3].

The aim of this study is to evaluate the clinical progress of meningococcal sepsis caused by rare serogroup B meningococcus in two sucking.

Materials and methods: In a period from 17.10 to 11.12.2014 two cases of Meningococcal sepsis have been treated in the Clinic of Infectious Diseases, University Hospital of Stara Zagora. They are a 10 months-old female and a 12-months-old male. Both children are from Romani ethnic community in Stara Zagora region. Clinical, epidemiological, laboratorial, microbiological and molecular-genetic tests were made. The pathological data obtained in the second case.

Case Report 1

A 10 months-old female was presented to the Emergency Center, University Hospital of Stara Zagora with a 7 day history of fever - 38°C and poor feeding. One day prior to admission the child began vomiting and appeared inactive. Some hours later a rash appeared: first on the trunk, subsequently involved the whole body. The child was born of third uncomplicated pregnancy, incompletely vaccinated. The patient was admitted in a generally bad condition with fever - 38°C, drowsy and irritable. When examined the patient presented sore throat, pale skin with polygonal hemorrhagic-necrotic rash 2-3 millimeters in diameter localized on the buttoks, thighs and forearms. The cardiorespiratory examination was unremarkable. The neurological examination revealed brisk tendon and peristolic reflexes with enlarged reflexogen tones, meningeal irritation – severe neck stiffness, and positive Brudzinski's neck sign. Cranial nerve examination showed no lesions. Blood tests showed leukocytosis and moderate anemia. On the day of admission the level of protein (Table 2). CSF cultures were positive for N. meningitidis group B. The diagnosis was confirmed by PCR test. On the 7-th hospital day fever, skin rash and signs of meningeal injury completely disappeared. The patient was treated with appropriate antibiotics and supportive therapy. The child fully recovered after a hospital stay of 13 days.

Case Report 2

A previously healthy 1-year old male was presented to the Emergency Center, University Hospital of Stara Zagora with one day history of fever, cough, coryza, vomiting and diarrhea.

<table>
<thead>
<tr>
<th>Variable (unit)</th>
<th>Reference range</th>
<th>Patient 1</th>
<th>Patient 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin (g/L)</td>
<td>107-131</td>
<td>90.4</td>
<td>90</td>
</tr>
<tr>
<td>Erythrocyte (x1012/L)</td>
<td>4.0-5.2</td>
<td>4.01</td>
<td>4.33</td>
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<td>Hematocrit (%)</td>
<td>0.33-0.45</td>
<td>0.27</td>
<td>0.27</td>
</tr>
<tr>
<td>White Blood Cells (x109/L)</td>
<td>6.0-17.5</td>
<td>22.6</td>
<td>21.1</td>
</tr>
<tr>
<td>Prothrombin Time (%)</td>
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<td>19</td>
<td>120.4</td>
</tr>
<tr>
<td>Fibrinogen (g/L)</td>
<td>2.0-4.5</td>
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<tr>
<td>Urea (mmol/L)</td>
<td>3.4-8.4</td>
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<td>4.7</td>
</tr>
</tbody>
</table>

Table 1. Laboratory findings in patients with Meningococcal Sepsis

<table>
<thead>
<tr>
<th>Variable (unit)</th>
<th>Reference range</th>
<th>Patient 1</th>
<th>Patient 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin (g/L)</td>
<td>0.15-0.45</td>
<td>2.1</td>
<td>1.7</td>
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<tr>
<td>White Blood Cells (x106/L)</td>
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<td>25 600</td>
<td>6 400</td>
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<tr>
<td>Erythrocyte (x1012/L)</td>
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<td>4.95</td>
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<tr>
<td>Pandy's Test</td>
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<td>++</td>
<td>–</td>
</tr>
<tr>
<td>CSF Culture</td>
<td>N. Men- ingitidis Group B</td>
<td>No</td>
<td>N. Men- ingitidis Group B</td>
</tr>
</tbody>
</table>

Table 2. CSF data in patients with Meningococcal Sepsis

Note: CSF – Cerebrospinal Fluid.

Fast breathing with moaning and pallor occurred in hours before hospitalization. The child was born on third uncomplicated pregnancy. He was also incompletely vaccinated. The members of the family suffered of respiratory infection a week before the child's hospitalization. On admission the patient was somnolent with Glasgow come score ≤ 8. There was a clinical manifestation of septic shock – marked pallor on the face and trunk with hemorrhagic rash widely distributed over the trunk and extremities, cold and cyanotic lips and extremities. The temperature was 36.2°C, the respiration rate was 60-70 / minute, the pulse rate was 140-160 / minute. The physical examination found sore throat, liver and spleen enlargement. All tendon and periostal reflexes were decreased. Signs of meningeal injury were absent.

Laboratory findings showed leucopenia and coagulation disorders. Lumbar puncture was performed and CSF tests estimated pleocytosis with proteinorachia. CSF cultures were negative for N. meningitidis group B. Blood test was positive for N. meningitidis group B by PCR method.

In a few hours after the admission the condition was deteriorate, Glasgow come score ≤ 3. The respiratory symptoms get worsen and the respiratory failure and cardiac arrest have been
developed. A postmortem lividest rash appeared on the extremities and abdomen (Figure 1a). Despite the adequate reanimation procedures the patient died. The autopsy was performed and the pathological exam found bilateral adrenal apoplexy (Figure 1b).

Figure 1. Post-mortem type of lividity in the low extremities and abdomen (a), Bilateral adrenal apoplexy (b).

Discussion
Meningococcal sepsis account for 5 to 20 % of Meningococcal disease. Blood cultures are positive for N. meningitidis in over 75% [4].

Case 1 had the typical clinical presentation of Meningococcal sepsis with meningitis. The patient didn’t develop any complications and was discharged recovered. Case 2 developed the worst clinical form of Meningococcal disease - Waterhouse-Friderichsen syndrome. Signs of meningitis didn’t occur. A fulminating course of septic shock, disseminated intravascular coagulation, multi-organ failure and a lethal outcome occurred in less than 24 hours. Both children were eutrophic previously healthy and without any underlying diseases. They were brought up in comparatively comfortable living conditions. Their immunization history was not appropriate for the age, because of their parents’ low education. A respiratory infection affected the family members of case 2, most probably caused by N. meningitidis. Due to the lack of collaboration with the family the diagnostic tests were not performed.

The clinical presentation of Meningococcal sepsis with central nervous system’s involvement is typical, but sometimes the classic symptoms may be absent or difficult to notice. Widespread petechial rash is an early typical finding [5]. The reported case 1 illustrates such a clinical presentation with a favorable outcome. The prognosis of Meningococcal meningitis is relatively good if the patient is not comatose. Poor prognostic findings are thrombocytopenia, coagulation disorders, moderate anemia, unconsciousness and seizures [6]. The etiological diagnosis is based on the good standard for Gram stain, CSF and blood cultures. The application of new diagnostic methods as PCR is substantially increased in routine practice. They can be used as for the detection of bacterial and viral pathogens [8]. It is easy to mistake the early signs and symptoms of Meningococcal disease, especially they are presented as acute respiratory infection, septic shock and lethal outcome within 24 hours. The survivors suffer from a number of significant sequelae [7]. Multivalent polysaccharide vaccines against serogroups A, C, Y, and W are licensed and available worldwide. Development of a vaccine against serogroup B meningococcus has been problematic because of its morphologic diversity. Despite of this recently it is in being in some countries [9].

The present cases are typical clinical manifestation of Meningococcal infection. The diagnosis was suspected on the admission and the appropriate diagnostic and therapeutic methods were applied. The outcome of case 1 was favorable as other reported cases of Meningococcal meningitis. The result of Waterhouse-Friderichsen syndrome, whose developed in case 2 was fatal, the child died in less than two days after the onset of the symptoms.

Competing interests
The authors declare that they have no competing interests.

References
2. World Health Organization (WHO). Meningococcal meningitis (Fact Sheet Nº 141, Updated November 2015).

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