



Case Report

Meningococcal Meningitis In Children: A Case Report

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Abstract: Meningococcal meningitis is brain membrane (meninges) inflammation caused by *Neisseria meningitidis* (Meningococcus) bacteria. In the child population, meningococcal meningitis is a rapid-onset disease with high morbidity and mortality rates. In this case, a 7-year-old boy admitted to the Emergency Room of dr. Soebandi Hospital, Jember, presented with seizure, decreased of consciousness, fever, and positive meningeal signs. The results of laboratory and radiological investigations showed bacterial meningitis caused by *Neisseria meningitidis* bacteria. This patient was treated with antibiotics, symptomatic and supportive medication, which gave a good result. It is important to publish all clinical findings, laboratory examinations, and management of this case so that health workers are aware of the spread possibility of meningococcal meningitis.

Keywords: Meningitis; Meningococcus; Children

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1. Introduction

Meningitis is an inflammation of the brain membrane (meninges) that is caused by bacterial, viral, or fungal infection. Meningitis is a serious disease that can be life-threatening and it's often associated with long-term morbidity. Given significant geographic variation, meningitis has a worldwide incidence of between 1 and 13 cases per 100,000 people per year. Acute bacterial meningitis is a disease with a rapid onset that has the potential to become an epidemic disease and has high mortality and morbidity rates. Bacterial meningitis is caused by bacterial infection of the meninges, resulting in inflammation. This infection is acquired from the community or nosocomial. Community-acquired bacterial meningitis is the result of bacterial invasion of the meninges due to bacteremia or the direct extension of local infection. In children, infections often occur in the upper respiratory tract and ears, where these two places are the multiplication locations for most of the bacteria that cause meningitis, so it is very necessary to conduct studies regarding the course of bacterial meningitis in children.

2. Case Report

A 7-year-old boy, 20 kg body weight, 132 cm body height, came to the emergency room at dr. Soebandi Hospital, Jember, with a seizure and decreased of consciousness (GCS E2V3M5). The patient had seizures four times on the previous day, the seizures lasted $\pm$ 5 minutes each with repeated jerking of his hands and feet, and the seizures stopped without medication. The patient complained of a high fever for the last 14 days, the fever reached 39.4°C and only decreased by taking fever-reducing medication. Complaints of fever accompanied by cough with phlegm and runny nose. The patient also complained of pain in his left ear for the last 7 days, but it was not accompanied by any discharge from the ear.

The patient had a history of lymphadenitis tuberculosis four years ago and has completed treatment with a pediatric TB regimen. However, the patient did not complain of a long-standing cough. The patient also had no previous history of seizures.

When he came to the emergency room at RSD dr. Soebandi, he underwent a physical examination and found that the patient's general condition was weak, somnolence with GCS E2V3M5, fever at 38.8°C, heart rate of 165 times per minute, respiratory rate of 28 times per minute, and blood pressure of 100/70 mmHg. On examination of the meningeal signs, he had neck stiffness, a positive Burdinski I, and positive Kernig's sign. On examination of the head and neck, there were no signs of anemia, jaundice, cyanosis, or dyspnea in the patient, and no enlarged lymph nodes were found. On chest examination, vesicular breath sounds were found in both lung fields, there were no rhonchi or wheezing in both lung. Normal heart sound and no additional heart sounds were obtained. On abdominal examination, the abdomen was flat, soft, with normal bowel sounds, and without tenderness. On examination of the extremities, there was warmth in all four extremities and no edema was found in any of the four extremities. Calculating the patient's nutritional status, the patient is classified as malnourished according to the WHO classification with a Z-Score value of <-3 standard deviations. When calculating the tuberculosis score, a score of 4 was obtained.

Blood tests showed the following results in Table 1. Afterwards, examinations were carried out on cerebrospinal fluid, and the results were shown in Table 2. Based on that, presumption leads to bacterial infection. On the culture results, Gram-negative diplococcus bacteria were found with a background of PMN cells and epithelial cells that indicate *Neisseria meningitis* or *Meningococcus* bacteria. A CT scan of the head with contrast was also carried out, and the results shown in Figure 1 with presumption of meningitis.

Course of the illness

The patient had a fever when he arrived at the hospital until the 8th day of treatment, did not experience seizures during treatment, positive neck stiffness gradually decreased and disappeared on the 12th day of treatment, and also the patient complained of headaches until the 12th day of treatment. The patient had constipation for 6 days during treatment and improved with medication. The patient had difficulty eating during treatment, but there were no complaints about drinking or urinating. On the 15th day of treatment, the patient had no fever, the stiff neck disappeared completely, there were no complaints of headaches, no nausea, no vomiting, no complaints of urination, defecating smoothly, eating and drinking smoothly. On physical examination, the head, neck, thorax, abdomen, extremities, and meningeal signs were all within normal limits.

Diagnosis and Management

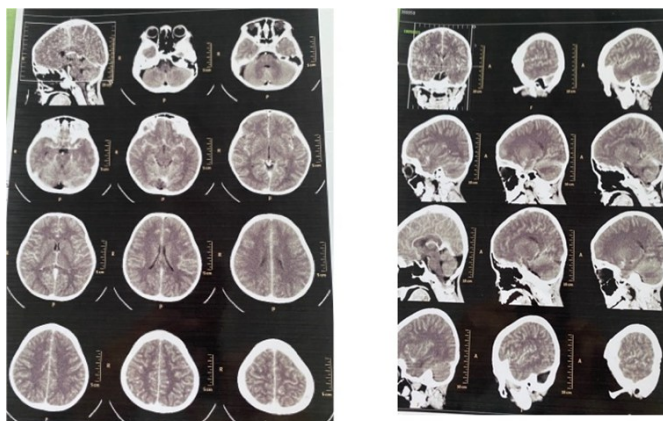
Based on anamnesis, physical examination, and supporting examinations, the patient was diagnosed with bacterial meningoencephalitis due to *Meningococcus* bacteria. The patient was given treatment with an infusion of D5 ½ NS 1500 mL/24 hours, 250 mg paracetamol injection three times a day, 20 mg ranitidine injection twice daily, 3mg ondansetron injection three times a day, 6 mg diazepam injection for seizures, 3 mg dexamethasone injection three times a day, 1 gram cefotaxime injection 4 times a day, oral vitamin B complex once daily, ½ teaspoon lactulose, a high-calorie high-protein diet, and physiotherapy. On the 16th day of treatment, the patient was allowed to go home and was given home medication with 100 mg cefixime orally twice daily and 250 mg paracetamol if necessary.

Tabel 1. Blood tests results at the admission day

Complete blood count	Result	Reference
Hemoglobin	11.5 gr/dL	11.5-15.5 gr/dL
Leukocytes	16.3 (H)	4.5-13.5 x 10 ³ /uL
HCT	33.1% (L)	35.0-45.0%
Thrombocytes	259 x 10 ⁹	150-450 10 ⁹ /L
Segment	90	
Lymphocytes	6 (L)	28-48
Random glucose level	112	<200
Liver function		
Albumin	3.1 g/dL (L)	3.4-4.8 g/dL
Kidneys function		
Creatinine serum	1.1 mg/L (H)	<0.6
Serum Electolite		
Natrium	153.1	135-155 mmol/L
Potassium	7.48 (HH)	3.5-5.0 mmol/L
Chloride	131.9 (HH)	90-110 mmol/L
Calcium	2.53	2.15-2.57 mmol/L
Phosphor	1.82 (H)	0.85-1.60 mmol/L
Magnesium	0.99	0.77-1.03 mmol/L

Tabel 2. The results of cerebrospinal fluid examinations

Characteristics	Results
Colour	Yellowish
Clarity	A bit murky
Coagulation	Negative
Nonne Aple	Positive
Pandy	Positive
Leukocytes	447.0
Count types	MN: 32 and PMN: 68%
Erythrocytes	0.00
Albumin	0.3
Glucose	2.0

**Figure 1.** The result of the head CT scan with contrast showed meningitis

3. Discussion

Meningitis is an inflammation of the meninges. Bacterial infection of the meninges can cause infection of the brain parenchyma, resulting in encephalitis that occurs simultaneously with meningitis, so it is more often referred to as meningoencephalitis [1]. This infection can be caused by bacterial, viral, or fungal infection. Encephalitis is a serious and sometimes can be a life-threatening disease [2]. Given significant geographic variation, encephalitis has a worldwide incidence of between 1 and 13 cases/100,000/year [3]. Most cases of meningoencephalitis in America are caused by *Meningococcus* bacteria [4]. Meanwhile, in Switzerland, viruses are one of the most common causes of meningoencephalitis, while in the UK, the herpes simplex virus (HSV) is the most common cause of encephalitis infection. Other cases of encephalitis are caused by infectious agents, including varicella zoster virus (VZV) and *Mycobacterium tuberculosis*, or by cellular or humoral autoimmune processes [5], [6]. In 37-67% of patients, the cause of encephalitis remains unknown [1].

Acute bacterial meningitis is a disease with a rapid onset, and it has the potential to become an epidemic disease, also has high mortality and morbidity rates [2], [7]. Bacterial meningitis is caused by bacterial infection of the meninges, resulting in inflammation. This infection is acquired from the community or nosocomial. Community-acquired bacterial meningitis is the result of bacterial invasion of the meninges due to bacteremia or the direct extension of local infection [8]. The most common bacterial causes vary by age. Group B *Streptococcus* is common in babies aged less than 2 months, while *Streptococcus pneumoniae* is most common in all other age groups except ages 11-17 where *Neisseria meningitidis* is the most common cause of meningitis in those aged under 10 years [1]. The results of this epidemiological study are in line with the findings in this case, in which meningococcus bacteria were found in the lumbar puncture of this patient, who was 7 years old.

The mechanism causing infection of the brain and its membranes is bacteremia, or bacteria in the blood, which can cause bacteria to cross the blood-brain barrier. This can only be done by certain bacteria, especially *N. meningitidis* and *S. pneumoniae*. Direct extension of otitis media or sinusitis to the central nervous system (CNS) may also occur. Dural defects, whether congenital or acquired, allow bacteria to enter the CNS. Nosocomial bacterial meningitis is the result of manipulation of the meninges during neurosurgical procedures. Bacterial invasion into the subarachnoid space causes inflammation of the meninges [9], [10]. In this case, the patient complained of coughing and pain in the ears 1 week before cerebrospinal complaints appeared. This is in line with the theory of the pathomechanism of infection in the brain and its membranes, which goes through hematogenous infection and the development of pathogenic bacteria in the mucosa of the respiratory tract and middle ear cavity.

This inflammatory process in the brain and its membranes causes fever, headaches, changes in mental status, seizures, and focal or generalized neurological deficits due to decreased perfusion and increased intracranial pressure. Clinical findings that can be assessed are the presence of meningeal signs, which are the stiff neck, Burdzinski sign, Kernig sign, and Lasque sign [8], [11]. This theory is in line with the findings in this case, which are decreased consciousness, fever, seizures, positive neck stiffness, also positive Kernig and Burdzinski sign.

Meningoencephalitis therapy is given to eliminate the cause and relieve symptoms. Therapy given includes antibiotics according to the results of gram staining or cerebrospinal fluid culture, oral steroids, anticonvulsants, antipyretics, and analgesics, as well as airway and breathing management. The antibiotics that can be given are penicillin and cephalosporin. Providing third-generation cephalosporines, especially ceftriaxone, is recommended in cases of meningoencephalitis caused by the bacteria *Neisseria meningitidis* and *Streptococcus pneumonia* [12], [13]. Providing oral steroids is also recommended in cases of meningoencephalitis because the effects of steroids can widen

the blood-brain barrier, making it easier for antibiotics to enter [14], [15]. Providing oral steroids is recommended 30 minutes before antibiotics are given. This patient was given antibiotic therapy with Cefotaxime according to existing theory, at 4000 mg/day divided into 4 doses. This patient was also given dexamethasone. The patient in this case was also given gastroprotectants, vitamin B complex, and symptomatic therapy.

4. Conclusion

Cases of meningitis or inflammation of the brain membranes, can indeed be based on various previous local infections and have various clinical manifestations. This case describes a 7-year-old child who was diagnosed with bacterial meningitis based on the anamnesis, physical examination, and supporting examinations. From the anamnesis, it was found that the patient had a history of fever, cough, and ear pain for several days. From the physical examination, there were positive meningeal signs, seizures, and decreased consciousness. From the supporting examination lumbar puncture, CT scan of the head with contrast, and CSF culture showed consistent findings with a diagnosis of bacterial meningoencephalitis due to *Meningococcus* bacteria. The prognosis for this disease varies depending on the speed and accuracy of treatment. This patient was discharged from the hospital with a complete recovery and no neurological deficit after 16 days of treatment.

5. Conflict of Interest

The author declares that there is no conflict of interest in this research.

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