



CASE REPORT

INFECTION THAT UNDERLIES THE OCCURRENCE OF FEBRILE SEIZURES: A CASE REPORT OF A 2-YEAR-OLD BOY WITH COMPLEX FEBRILE SEIZURE

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ABSTRACT

Background: Febrile seizures are seizures associated with fever during childhood that most often occurs in children ages six months-five years, with a peak incidence of 18 months. Although febrile seizures generally have a good prognosis, they can signal an underlying serious acute infectious infection. This report aims to present a case of febrile seizures associated with the underlying extracranial infection in Semarang. **Method:** This report describes the anamnesis, physical examination, and supporting examination in patients with febrile seizures. **Case:** A 2-year-old boy coming to the ER with complaints of seizures that accompanied by fever. When the child seizures are unconscious, after the seizures the child cries. **Discussion:** The patient came with seizures accompanied by fever three times before being taken to the hospital, the duration of the seizure \pm 10 seconds, with a range of \pm 2 hours between the first, and the next seizures, twitching convulsions throughout the body, eyes glared upwards, when the child got the seizure, he was unconscious, and after a seizure, the child cries. Three days before, the child had a fever and a cough with yellowish phlegm. On physical examination, it was found ronchi in both lung fields. From x-ray obtained bronchopneumonia picture. Patients diagnosed with complex febrile seizures and bronchopneumonia. **Conclusion:** Patients were diagnosed with complex febrile seizures and bronchopneumonia, treated for six days, and sent home because the patient's clinical condition improved. Infection is associated with the incidence of febrile seizures.

Keywords: seizures, fever, infection, children

INTRODUCTION

Febrile seizures most likely occur at an increase in body temperature over 38°C due to an extracranial process.¹ About 2%-5% of children under five years have experienced a febrile seizure. Most often occurs in children between the ages of 6 months to 5 years and the peak event at 18 months.² Fever seizures occur more often in boys than in girls.³ Although febrile seizures generally have a very good prognosis, febrile seizures may indicate an underlying serious illness such as sepsis or bacterial meningitis.² Fever seizures must be distinguished from epilepsy, which is characterized by repeated non-febrile seizures.

In several countries, the incidence and prevalence of febrile seizures are different. In the United States and Europe, the prevalence of febrile seizures ranges from 2-5%. In Asia, the prevalence of febrile seizures has doubled compared to Europe and

America.³ Nevertheless, the prognosis of seizures is good; most patients recover completely. The mortality rate is only 0.64% - 0.75%.⁴

Classification of febrile seizures according to the National Collaborative Perinatal Project criteria is simple febrile seizures and complex febrile seizures. Simple febrile seizures are febrile seizures in which seizures last less than 15 minutes. They are common and do not recur in one episode of fever. Complex febrile seizures are febrile seizures that last longer than 15 minutes, either focal or multiple. Recurrent febrile seizures are febrile seizures that occur in more than one fever episode. Generally, febrile seizures in children occur at the onset of acute fever, in the form of generalized clonic seizures or clonic tonics, brief and no signs of postictal neurology.⁵

EEG examination in febrile seizures can show slow waves in the back region that are bilateral, often



asymmetrical, sometimes unilateral. EEG examination is performed on complex febrile seizures or children who are at risk for epilepsy. Lumbar puncture examination is indicated at the first time when a febrile seizure occurs to rule out the process of intracranial infection, subarachnoid hemorrhage or demyelinating disorders, and it is recommended in children aged less than two years who suffer from febrile seizures.⁶

CASE REPORT

A boy aged two years came to the ER Kariadi Hospital complained a seizure 3 hours before entering the hospital. The patient's mother said that the seizures accompanied by 39-40°C fever. Duration of seizure was 3-10 seconds, within one day, the seizure has occurred three times with a range of approximately 2 hours between the first seizure and subsequent seizures. The seizures were twitching throughout the body; eyes glared upwards when seizures of the child are unconscious. After a seizure, the child cries. After the third seizure, the patient went to the ER of Kariadi Hospital with his mother. When the patient arrived at the ER, the patient got a seizure, duration of 10 seconds, during the seizure of the child unconscious, after the child seizures cry, seizures stop themselves.

During hospitalization for three days, the patient had a seizure for two times. Patients with seizures with a duration of 3-10 seconds, twitching convulsions throughout the body, eyes glare upwards when the seizures occur the patient is unconscious. Before the seizure, the child looked fine. However, after the seizure, the child cries. Seizures accompanied by fever, the temperature was 39°C.

Three days before hospital admission, the patient had a 39°C fever. The fever went down with an antipyretic but rose again after about 6 hours. Fever accompanied by coughing, the sputum is challenging to come out, the phlegm was yellowish, no cold, sore throat, spasms, vomit, nor rash.

Patients have a history of seizures about three months ago, and it happened only once, seizures with a duration of 5 seconds, convulsions twitching throughout the body, eyes glared upwards when

seizures of the child are unconscious. Before the seizure, the child looks normal; after the seizure, the child cries—seizures accompanied by fever. The temperature before the seizure was 39°C. Only given antipyretic drugs and did not go to health facilities. The patient hospitalized in Kariadi Hospital two weeks ago due to bronchopneumonia, and blood examination resulted in a low potassium level.

On examination, the general condition was good, and the child was active. The patient's pulse was 110x/minute; the respiratory rate was 24x/minute; the temperature was 36.8°C; the oxygen saturation was 99%. The child's weight is currently 11.5 kg, with a body length of 81 cm. WHZ 1.14 SD, WAZ -0.64 SD, HAZ -2.27 SD, HC +1.91 SD that the conclusion was good nutrition, short stature, adequate body weight. On physical examination of the respiratory system, appeared symmetrical when statistical and dynamic, normal chest shape, no deformity, no retraction. On palpation, the stem fremitus was normal on both lung fields, sonor percussion in the entire lung field, auscultation obtained vesicular base sound in both lung fields, but there was rhonchi in the right and left lung fields, no wheezing. For examination of the head, eyes, ears, nose, mouth, neck, heart, and abdomen within normal limits. On genital examination, there was hyperemic ostium urethrae externum. And for extremities examination, all within normal limits. This patient also performed a neurological physical examination and obtained resulted in normal limits.

On January 6, 2020, Semi erect-Lateral AP x-ray thorax examination performed and resulted in a bronchopneumonia picture. Then, on January 19, 2020, a routine blood test performed and resulted in mild anemia (hemoglobin: 10.7 g/dL), low hematocrit (34.9%), low erythrocytes (4.48 x 10⁶/uL), high RDW (23.2%). From clinical chemistry, resulting in low creatinine (0.5 mg/dL), and low calcium (2.1 mmol/L).

The patient got an infusion of D5 ½ NS 480/20cc/hour, paracetamol 5ml/4 hours, diazepam 1.5 mg/8 hours during fever, N-acetylcysteine 50mg/8 hours. After six days of treatment, there was a clinical improvement, and the patient sent home.



DISCUSSION

Febrile seizures are seizures that occur in children aged six months to 5 years and associated with fever, with no intracranial infection or other abnormalities are apparent.⁶ Febrile seizures divided into two groups, namely simple febrile seizures and complex febrile seizures. Most (63%) of febrile seizures are simple febrile seizures, and 33% of complex febrile seizures.⁴ Fever is a response to pyrogenic stimulation, which causes monocytes, macrophages, and Kupffer cells to secrete an endogenous pyrogen (IL-1, TNF alpha, IL-6, and interferon) which acts at the hypothalamic thermoregulation center for improving thermostat benchmarks.² Endogenous pyrogen increases the reference point to 38.9°C; the hypothalamus feels that the normal temperature of pre-fever at 37°C is too cold, and this organ triggers cold response mechanisms to increased body temperature. Fever that occurs can trigger a febrile seizure.

The pathophysiology of febrile seizures is still unknown. In a state of fever, an increase in the body's chemical reaction occurs. Thus oxidation reactions occur faster, and the oxygen will quickly run out, resulting in hypoxia. Active transport that requires ATP will disrupt, so intracellular sodium and extracellular potassium increase, which will cause membrane potential to decrease or nerve cell sensitivity to increase.⁷

Fever can cause seizures through the following mechanisms: Fever can reduce the value of the seizure threshold in immature cells; dehydration resulted in electrolyte disturbances that disrupt cell membrane permeability; increased basal metabolism, resulting in accumulation of lactic acid and CO₂ which will damage neurons; fever increases Cerebral Blood Flow (CBF) that may increase oxygen and glucose requirements, causing interference with the flow of ions in and out of cells.⁸

The diagnosis of febrile seizures obtained from the history, physical examination results, and additional examination can be added to rule out differential diagnosis. According to the Consensus

Statement on Febrile Seizures, febrile seizures are seizures in infants and children, usually occurring between the ages of 3 months and five years, associated with fever, but there is no evidence of intracranial infection or other causes. Classification of febrile seizures according to the National Collaborative Perinatal Project criteria is simple febrile seizures and complex febrile seizures. Simple febrile seizures are febrile seizures whose seizures last less than 15 minutes and do not recur in one episode of fever. Complex febrile seizures are febrile seizures that last longer than 15 minutes, either focal or multiple. Recurrent febrile seizures are febrile seizures that occur in one fever episode. Generally, febrile seizures in children take place at the onset of acute fever, in the form of generalized clonic seizures or clonic tonics, brief and no signs of postictal neurological signs.^{6,9,10,8,11}

EEG examination in febrile seizures may show slow waves in the back region that are bilateral, often asymmetrical, sometimes unilateral. EEG examination is carried out in complex febrile seizures or children who are at risk for epilepsy.⁶

Lumbar puncture examination is indicated at the first time when a febrile seizure develops to rule out the process of intracranial infection, subarachnoid hemorrhage or demyelinating disorders, and recommended for children aged less than two years who suffer from febrile seizures.^{6,12,7}

The purpose of treatment in febrile seizures in children is to prevent recurrent febrile seizures, prevent epilepsy and mental retardation, increase the quality of life of the child and family. Children with seizure's first aid are to keep the airway open. Lose the clothes, make sure the patient's position prevents the aspiration. Most seizure cases stop on their own, but can also continue or recur. Mucus suctioning and oxygen administration must be done regularly, do intubation if necessary. Fluid therapy, calories, and electrolytes maintenance must be considered.¹⁰ Body temperature can be reduced by compressing with warm water (wiped) and oral antipyretics (acetaminophen 10-15mg/kg, four times daily, or ibuprofen 20 mg/kg, four times a day).



Diazepam is currently the drug of choice for acute phase febrile seizures because diazepam has a short effect. Diazepam can be given intravenously or rectally if given intramuscular absorption is slow. The diazepam dose in children is 0.3 mg/kg body weight, given intravenously in acute phase febrile seizures, but often fails in younger children. If an intravenous line has not been installed, diazepam can be given rectally at a dose of 5 mg if the body weight is less than 10 kg and 10 mg if more than 10 kg. Rectal diazepam is safe and effective, and easily can be given by parents at home. If diazepam is not available, an intramuscular injection of luminal can be given with an initial dose of 30 mg for neonates, 50 mg for ages one month-1 year, and 75 mg for over one year. Intranasal midazolam (0.2 mg/kg body weight) has been studied as being safe and effective in anticipating acute febrile seizures in children. The speed of absorption of midazolam into the venous blood flow and its effects on the central nervous system is quite good. But the therapeutic effect is still lacking when compared with intravenous diazepam.^{11,12,13}

The patient is a 2-year-old boy. This condition is suitable for the theory that febrile seizures occur between the ages of 6 months and five years. It is twice as common in boys as girls. In the history of seizures, accompanied by fever, with a duration of approximately 10 seconds, a seizure occurs three times a day. This condition is in accordance with the criteria for the diagnosis of febrile seizures and is included in the classification of complex febrile seizures because more than one seizure is present in less than 24 hours.

The data obtained from the history is fever three days before the seizure accompanied by coughing and yellowish phlegm, physical examination obtained ronchi in both lung fields, chest x-ray obtained bronchopneumonia picture. Bronchopneumonia is thought to be an infection that underlies the febrile seizures. 18.8% of children hospitalized had febrile seizures had an infection which was bacterial pneumonia.¹⁵ Diarrhea was another main cause of febrile seizures. Most febrile seizures occur in winter,

and the seasonal peak occurs in January. Suspected as a higher viral infection.⁷

CONCLUSIONS AND SUGGESTIONS

From anamnesis, it was found the seizures accompanied by fever, twitching convulsions throughout the body, seizures occurred 10 seconds, during seizures, the child was unconscious, after the seizures of children cry. Fever started three days before entering the hospital accompanied by cough, sputum difficult to remove with yellowish phlegm. On physical examination, there was ronchi in both lung fields. From the results of investigations, thorax x-ray showed a bronchopneumonia picture. The diagnosis was complex febrile seizures.

Management of febrile seizures in children includes acute phase treatment, keep the airway patent, and monitoring the body's vital functions. Intravenous or rectal diazepam is the drug of choice because it has a short effect. If there is no diazepam, intramuscular injection or luminal intranasal midazolam can be used. The lumbar function is recommended in children younger than two years because neurological symptoms are challenging to find. Other supporting laboratory tests are carried out as indicated.

Based on the following case report explains that infection is associated with the incidence of febrile seizures. Based on research, infections that significantly underlie febrile seizures include influenza, bacterial pneumonia, and diarrhea. Physicians must conduct a comprehensive examination of infectious patients to prevent further febrile seizures. The authors also recommend further epidemiological investigations regarding infections that underlie the occurrence of febrile seizures.

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