

Case Report

Complex Febrile Seizure: A Case Report

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Abstract

A 4-year-old boy came to the hospital with febrile seizure around 4 times in 24 hours. Febrile is around 40°C and seizure more than 15 min. The therapy was given diazepam suppository 5 mg, but the seizure still remains. The patient needed to hospitalization and was given diazepam IV.

Keywords: Seizure; Febrile; Diazepam

Introduction

Febrile seizures are seizures that occur in children aged 6 months until 5 years, who experience an increase body temperature of more than 38°C, by any measurement method and which is not caused by intracranial processes (by extracranial processes). It should be noted that fever must precede seizures [1,2].

Fever that triggers seizures come from extracranial processes, around 90% are the result of viral infections such as: Rotavirus and Parainfluenza. Apart from viruses, febrile seizures are also caused by acute upper respiratory tract infections, acute otitis media, roseola, urinary tract infections, and gastrointestinal infections. Febrile seizures can also be inherited genetically so that neuronal excitation occurs more easily, but the pattern of genetic inheritance in febrile seizures is still unclear [1,3].

Clinically, febrile seizures are divided into two classifications by Living Stone Criteria based on age, duration, frequency of seizure, type of seizures. (1) Simple febrile seizure is seizures with short duration (<15 min), generalized form of seizures (tonic and or clonic seizure), and do not recur within 24 hours. Usually, a simple febrile seizure occurs <5 min and stops on its own. (2) Complex febrile seizures are seizures with prolonged duration (>15 min), one-sided focal or partial seizures, or generalized seizures preceded by partial seizures. Complex febrile seizures usually recur more than 1 time within 24 hours [2].

Here I present a case of 4-year-old boy with complex febrile seizures which seizures happen more than 1 times in 24 hours.

Case Presentation

A 4-year-old boy came to the ER of Bhayangkara Hospital with a seizure in the morning before entering the hospital. Patient parent said that seizure happened once at home after patient took medication. Patient had seizures with fever around 40°C. After that patient got

seizure again while on the way to hospital. The duration of seizure was around 15 min. Arrive at the hospital patient had seizures again 2 times. In 24 hours, seizure has occurred 4 times. During the seizure the patient was unconscious, after the seizure the patient regained consciousness and looked weak. When the eye spasms, the patient looks up and his body is stiff, his hands are clenched and stretched downwards. Fever for 2 days before admission to hospital. Fever goes up and down, but never at normal temperature. Fever rises at night reaching 40°C. Patient already has taken to the midwife and was given medicine. The patient has taken medication, but the fever has not gone down. Eat and drink are still normal, also defecation and urinary still normal.

Before fever, patient has a slight cough for 4 days ago. Patient did not have seizure before and patient has complete immunization and his mother said that there are no abnormalities during pregnancy. On examination, the general condition *compos mentis* but seems fatigue. The patient's pulse was 120/min; the temperature was 37.4°C the oxygen saturation was 99%. The child's weight is currently 18 kg, with a body length of 100 cm.

The examination of the head, eyes, ears, nose, mouth, and neck within normal limit. On physical examination of the respiratory system, appeared 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 lung fields, no ronchi or wheezing. Physical Examination for the abdomen within normal shape, abdomen sound was normal and there was no tenderness. The extremities examination within normal limit. This patient also performed a neurological physical examination and obtained resulted in normal limits.

On March 05, 2020, a routine blood test performed and resulted were hemoglobin: 11.6 g/dL, white blood cell 9700/ μ L, red blood cell $4.31 \times 10^6/\mu$ L, platelet 307000/ μ L. From electrolyte test resulted in low Natrium (133.5 mmol/l), low Potassium (3.00 mmol/l) and low Chloride (91.2 mmol/l).

The patient got an infusion of D5 ½ NS 1300 cc/24-hour, paracetamol injection 600 mg divided in 3 doses during fever, diazepam 6 mg if seizure presented, dexamethasone ½ ampoule/ 8 hours and Erysanbe syrup ½ tbsp/6 hours. After 3 days of treatment, there was a clinical improvement which is the body temperature was normal and there were no seizures anymore and the patient sent home.

Citation: Gongga VN. Complex Febrile Seizure: A Case Report. Med Life Clin. 2022; 4(1): 1035.

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Publisher Name: Medtext Publications LLC

Manuscript compiled: Apr 21st, 2022

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Discussion

Febrile seizures are seizures that occur in children aged 6 months until 5 years, who experience an increase body temperature of more than 38°C, by any measurement method and which is not caused by intracranial processes (by extracranial processes) [2]. It should be noted that fever must precede seizures. Fever that triggers seizures come from extracranial processes, around 90% are the result of viral infections such as: Rotavirus and Parainfluenza. Febrile seizures divided into two classifications, namely simple febrile seizures and complex febrile seizures. Simple febrile seizures are more common than complex febrile seizures, around 61.9% children with febrile seizures are simple and complex only around 38.1% [3,4].

Most simple febrile seizures are brief, bilateral, attacks of clonic or tonic-clonic form. Generally, these seizures will stop on its own. Once the seizures stop the child does not give any reaction for a moment, but after a few seconds or min the child will wake up and regain consciousness without any neurological disorders. According to Behrman in 1996, febrile seizures are associated with a high temperature rise and usually develop when the body temperature reaches 39°C or more characterized by the presence of a typical generalized tonic-clonic seizure lasting from a few seconds to 10 min. A febrile seizure lasting more than 15 min indicates an organic cause such as an infectious or toxic process. In addition, there can also be an inverted eye upwards accompanied by stiffness and weakness as well as repeated jerking movements [5,6].

The pathophysiology of febrile seizures always begins with a significant increase of body temperature, in a fever state with an increase of temperature around 1°C will result in an increase of basal metabolism about 10% to 15% and oxygen demand will increase by 20%. In children aged 3 years the circulation of the brain reaches 65% of the whole body and adults only 15%. A certain increase in body temperature can result in a change in the balance of the neuron cell membrane and diffusion of sodium ions through the membrane due to an electrical discharge. This electrical discharge can be extended to all cells with the help of neurotransmitters and seizures occur. Furthermore, an increase of body temperature will result in an increase of basal metabolism, causing disruption of nutritional needs and reduced oxygen supply to the brain. Each child has a different seizure threshold. In children with a low seizure threshold, seizures can occur at a temperature of 38°C, while in children with a high seizure threshold, seizures will occur at 40°C [7].

The risk factors of febrile seizures are divided into several factors, such as age factor (around 4% occur in children with age 6 months to 5 years), based on a case-control study shows that it occurs in children aged 2 years related to brain development, namely the development window period begins with the organizational phase so that febrile seizures are more prone to occur. In the immature brain state, glutamic acid receptors as excitatory receptors are more active and GABA receptors as inhibitors are less active, so that the immature brain, excitation is more dominant than inhibition. Children under the age of 2 years have a low seizure threshold value so that it is easy to have febrile seizures. The seizure threshold is the lowest level of stimulation that can cause depolarization of the developing brain [8]. Gender factor, boys show a higher incidence of febrile seizures than girls. This is because girls get cerebral maturation faster than boys with a lower level of susceptibility to temperature increases than boys. A study showed that 55% of boys suffered from febrile seizures, while 45% of girls [9,10].

Body temperature Factor, fever is caused by an imbalance between heat production and excretion. Children with fever above 39°C have a risk of having a seizure 4 to 5 times greater than less than 39°C. Fever in infection occurs due to microorganisms that stimulate macrophages and form endogenous pyrogens. This substance acts on the hypothalamus with the help of the prostaglandin-forming cyclooxygenase enzyme. Prostaglandins will increase the hypothalamic set point. In high fever will result in hypoxic tissue to the brain. Fever is associated with the release of cytokines. Activation of the cytokine pathway will increase the risk of developing febrile seizures. The high body temperature at the time of seizure is called the seizure threshold value. The seizure threshold is different for each child. This difference in seizure threshold indicates that there are children who experience seizures after their body temperature rises very high, while in other children, seizures have occurred even though the temperature is not too high. Temperature variations influence cellular events and several neurological disorders triggered by high temperature including febrile seizures and episodic febrile ataxia [6]. The last, Birth weight factor, babies with Low Birth Weight (LBW) which is below 2,500 gm can cause asphyxia, brain ischemia, metabolic disorders such as hypoglycemia and hypocalcemia so that it can cause brain damage in the perinatal period. The presence of brain damage can cause seizures in later development. There was a study in Denmark and it was found that the risk of febrile seizures increases with weight loss at birth. Babies who have a low birth weight, which is below 2500 gm, are 1.5 times at risk for suffering from febrile seizures. Babies born weighing 2500 gm to 2999 gm have 1.3 times the risk and babies born weighing 3000 gm to 3499 gm have 1.2 times the risk, while babies born weighing >3500 gm have a risk of suffering from febrile seizures by 1 time [8,11].

The diagnosis of febrile seizures obtained from the history, physical examination results, and additional examination can be added to rule out differential diagnosis. The differential diagnosis of febrile seizures is meningitis, epilepsy or electrolyte imbalance. In febrile seizure need additional examination like blood routine, electrolyte, and blood sugar test. Cerebrospinal fluid examination is performed to establish or rule out meningitis. Electroencephalography (EEG) is not required for febrile seizures, unless seizures are focal; to determine the presence of a seizure focus in the brain that requires further evaluation, use to rule out epilepsy. Radiology Examination like Neuroimaging studies (CT scan or MRI of the head) are not routinely performed in children with simple febrile seizures. The examination is carried out if there are indications, such as persistent focal neurological abnormalities, such as hemiparesis or cranial nerve paresis [2].

The purpose of treatment in febrile seizures in children is to prevent recurrent febrile seizures, prevent epilepsy and mental retardation, and 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 seizures cases stop on its own, but can also continue or recur. For patients come in convulsion, the fastest drug to stop seizures is intravenous diazepam. The dose of intravenous diazepam is 0.2 mg/kg to 0.5 mg/kg slowly at a rate of 2 mg/min or within 3 min to 5 min, with a maximum dose of 10 mg. If febrile seizure happened at home (prehospital), parents can be given diazepam by rectal. The dose of rectal diazepam is 0.5 mg/kg to 0.75 mg/kg or rectal diazepam 5 mg for children weighing less than 12 kg and 10 mg for weighing more than 12 kg. If after rectal administration of diazepam, the seizures have not stopped, it can be repeated again in the same manner and

dose with an interval of 5 min. If after 2 doses of rectal diazepam the seizures still persist, it is recommended to go to the hospital [2].

In the hospital, intravenous diazepam 0.2 mg/kg to 0.5 mg/kg can be given. If the seizures do not stop, phenytoin is given intravenously at an initial dose of 10 mg/kg/time to 20 mg/kg/time at a rate of 1 mg/kg/minute or less than 50 mg/minute. If seizures stop, the next dose is 4 mg/kg/time to 8 mg/kg/day, starting 12 hours after the initial dose. If the seizures have not stopped with phenytoin, the patient must be treated in the intensive care unit. Antipyretics can be used for fever. Antipyretic like paracetamol dosage is 10 mg/kg/time to 15 mg/kg/time given every 4 hours to 6 hours. Ibuprofen dosage is 5 mg/kg/time to 10 mg/kg/time, 3 to 4 times a day [2].

The prognosis for febrile seizures is generally good. Neurological abnormalities may occur in cases of prolonged or recurrent seizures, both generalized and focal. Possible recurrence of seizures in some cases with risk factors such as family history of febrile seizures or epilepsy, age less than 12 months, body temperature less than 39°C during a seizure, quick convulsions after fever, and the first febrile seizure is a complex febrile seizure. If all of the above factors are present, the probability of recurrence of febrile seizures is 80%, whereas if these factors are not present, the probability of recurrence of febrile seizures is only 10% to 15% [2].

Conclusion

On this case from anamnesis, it was found the seizures with fever around 40°C. The seizures occurred around four time in 24 hours and seizure around 15 min. During the seizures, the child was unconscious after the seizure patient look conscious but fatigue. Fever started 2 days before entering the hospital, but before fever patient got a little cough last 4 days. On physical examination there were no abnormalities. In additional examination there were low electrolytes (low natrium, low potassium and low chloride) in this patient.

Management of febrile seizures in children includes prehospital treatment and hospital treatment. In prehospital or at home can be given diazepam suppositories with doses 5 mg for children under 12 kg and 10 mg for children more than 12 kg. Besides, the management in hospital if children come with seizure, first thing is keeping the airway patent and monitoring body's vital functions and give diazepam by intravenous or rectal. Antipyretics like paracetamol and ibuprofen can be given.

Based on the following case report explains that infection is associated with febrile seizure especially viral infection. Physicians must look for causes of febrile seizure, help to prevent further febrile seizures. The author also recommends to do some research about risk factors of febrile seizures around Nganjuk.

Acknowledgment

Best regard for Dr. Yeni Kusumawati Sp. A for the guidance and parents of patients that willing to take a history of their child's illness.

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