CASE ONE

Short case number: 3_12_01
Category: Children & Young People
Discipline: Paediatrics Medicine
Setting: Emergency Department_urban
Topic: Febrile Seizures

Case

You are the intern in the emergency department, Amelia Farrago a 2-year-old child who has been unwell with an upper respiratory tract infection, is brought in by ambulance. Her mother Rose, is quite distressed as she explains that she was nursing Amelia, who became stiff and then started shaking, she was blue around the lips, it only lasted about a minute or so "*but I was so scared I thought she was going to die*"
Vital signs: Well perfused. Temp 38^{0}C, RR 25/min, HR 125 bpm, BP 90/55

Questions

1. In your assessment of Amelia, what are the key features of history and examination that supports a diagnosis of febrile seizure in contrast to other seizure disorders e.g. epilepsy?
2. You explain to Rose, Amelia's mother that she has most likely experienced a febrile seizure; her mother asks what causes the seizure. What would you explain to her?
3. Amelia's family history reveals a second cousin who has epilepsy, outline the factors that increase the likelihood that febrile seizures will progress to epilepsy.
4. Outline the typical course of febrile seizures.
5. While you are examining Amelia, she starts to have another seizure, what is your acute management?
6. The seizure continues for over a few minutes, what is your next step in management and why?
7. Amelia, has no further seizures during her admission, outline your management plan for Amelia on discharge. If Amelia continued to have further febrile seizures how would your management recommendations change?

Suggested reading:

- South M, Isaacs D editors. Practical Paediatrics. 7th edition. Edinburgh: Churchill Livingstone;2012

- Dabscheck, G. Australian Doctor. How to treat. Febrile convulsions. 12 August 2011. pg. 26 – 32.

ANSWERS

1. A brief generalised tonic and/or clonic seizure in which there is no clinical evidence of central nervous system infection, the temperature is 38^0C or higher and the child has no history of previous afebrile seizures, neurological deficits or developmental delay to suggest an underlying neurological problem. In simple febrile seizures there is a lack of focal features, the seizure lasts < 15 minutes, resolve spontaneously and do not recur in the subsequent 24 hours. One significant clue that the event has been a true seizure is incontinence.
   A history of an upper respiratory or urinary tract infection or viral exanthemas with a febrile seizure that occurs once at the beginning of the illness. (Complicated febrile seizures are those that are prolonged - > 15 minutes, focal or multiple).

2. Febrile seizures occur in approximately 3% of the population, commencing between the ages of 6 months and 6 years, with most manifesting in the first 2 years of life. In approximately one-third of children febrile seizures are recurrent, the risk increasing to 50% if onset is in infancy or there is a family history of febrile seizures. Only 3% of children with febrile seizures go on to have later afebrile seizures i.e. epilepsy. Febrile seizures are not associated with any increased mortality or later intellectual impairment.
   An elevated temperature in association with infection is the trigger for febrile seizures in those who are genetically susceptible. There does not seem to be any good relationship between the level of temperature in the individual child and their particular risk of having a seizure (seizure threshold).
   The maturing brain is more susceptible to the effects of illness with the release of chemicals (cytokines) that cause a rise in core temperature, the production of other chemicals (acute phase reactants) and an activation of various systems within the body – endocrine, immune etc. This then results in the brain being more unstable and excitable resulting in seizure activity.

3. Only 3% of children with febrile seizures go on to have later afebrile seizures, i.e. epilepsy, the risk being increased further if there is evidence of abnormal development or neurological problems, if the child has a family history of epilepsy or if the seizures are complicated. A family history of febrile seizures can be elicited in 25-40 % of patients who experience them. In children whose siblings have had febrile seizures the rate is 9-22%. It is also thought that children whose parents have both had a febrile seizure have double the risk of febrile seizures. It is also known that there is an increased risk of epilepsy in children with a relatively low temperature at the first seizure, a young age of onset (<12 months) and a partial initial febrile seizure. Very rarely, later epileptic seizures may be the result of brain injury from prolonged and focal febrile seizures.
   The term 'generalised epilepsy with febrile seizures plus other symptoms' (GEFS+) has been used to describe a small group of children who have febrile convulsions in infancy and a strong family history of epilepsy. In some of these families there is a sodium channel defect.
   Children with initial recurrent, prolonged febrile seizure who develop epilepsy, ataxia and developmental delay may have Dravet's syndrome (also called severe myoclonic epilepsy of infancy).

4. Usually brief and resolve spontaneously and therefore most children present for medical management when the seizure has terminated. They usually do not recur in the subsequent 24 hours. In approximately one-third of children febrile seizures are recurrent, the risk increases with onset in infancy and with a family history.

Most febrile seizures occur between the ages of six months and three years, with peak incidence at about 18 months. It is uncommon for a febrile seizure to occur after age four years, and rare after six years. Only 3% go on to have afebrile seizures.

5. Nurse the child in the recovery position, ensure that there is no risk of injury by isolating the child from adjacent, potentially damaging objects.
   Do not attempt to put anything in the child's mouth but monitor airway and breathing. Use of high-flow oxygen if available.
   There is no evidence that giving antipyretics has any beneficial effect on febrile seizures nor that external cooling (tepid water, cooling blankets, circulating fans) abolishes the initial phase of the febrile response. Cooling may in fact cause peripheral vasoconstriction and shivering thereby raising core temperature and exacerbating the problem.
   Further management would be dependent on a history of recurrent or prolonged febrile seizures.

6. If a febrile seizure continues after 5 minutes, it should be terminated urgently. Buccal midazolam (dose 0.3mg/kg, max 10mg) is increasingly being used as first line treatment for cessation of seizures if IV access is not available. Parents can be taught to administer this at home in patients with a history of prolonged seizures. The medication is trickled into the patients cheek from a 5mg plastic ampoule (1ml). Dosing for parent's is usually rounded down to the nearest whole ampoule (5mg) in 4-10year olds or half an ampoule (2.5mg) in 1-3 year olds. Intranasal midazolam has also been shown to be effective. The benefits of buccal midazolam over intranasal administration is that the medication may still be given while the patient is lying on their side. In the past rectal diazepam was used to control seizures but there is reluctance to administer medication via this route due to the potential risk of rectal injury in children.
   If the seizure is in hospital and there is IV access available, an IV dose of Midazolam may be given (0.15mg/kg, max 10mg) for seizures lasting longer than 5 mins.
   Uncomplicated febrile seizures are extremely stressful for families and there is a general consensus that the seizures should be treated promptly.
   Complicated, prolonged febrile seizures need to be terminated to prevent the unlikely chance of brain injury resulting in later epilepsy.

7. Parents and carers need explanation of the natural history of the condition and reassurance about the likelihood of further febrile seizures, the infrequency of later epilepsy, the rarity of neurological problems and the management of subsequent febrile illnesses and seizures.
   Standard first-aid measures such as putting the child into the unconscious position and ensuring objects around them removed are appropriate.
   Nothing should be put into the child's mouth.
   If it became apparent that the child was experiencing recurrent or prolonged febrile seizures the option of using buccal midazolam in the future should be discussed. Some children are often given a test dose in hospital prior to administration in the community setting to ensure no respiratory depression with the prescribed dose.
   In children with recurrent, prolonged complex seizures, a discussion with paediatrician or paediatric neurologist about the use of anticonvulsants (there is some evidence that valproate may have a limited role) would be appropriate, but for other children with simple seizures it would not.
   An ambulance should be called when any seizure lasts longer than 10 minutes.