

Febrile convulsions

Febrile convulsions (FK, *convulsiones febriles*) are seizures with fever occurring in children between 6 months and 5 years of age, exceptionally also at the age of less than 6 months and at 6 and 7 years of age, which are not caused by neuroinfection or metabolic delirium and patients do not have a history of afebrile seizures..^[1] Febrile convulsions occur in 2-5% of children during their lifetime. They are the most common cause of convulsions in children under 5 years of age. In uncomplicated febrile convulsions, only antipyretics are indicated, not antiepileptics. Benzodiazepines are indicated for seizures lasting longer than 5 minutes. Uncomplicated febrile seizures are benign and generally have a very good prognosis.^[2]

Uncomplicated febrile convulsions (simple, simplex)

- short (mostly up to 5 minutes)^[1], max. up to 15 minutes^[2],
- generalized clonic seizures (possibly tonic-clonic or just atonia and impaired consciousness),
- usually with a quick return to full consciousness.

Complicated febrile convulsions (complex)

- focal (lateralized) seizures and/or
- seizures lasting more than 15 min and/or
- repeated seizures within 24 hours ^[1]

Febrile status epilepticus

- a convulsive state lasting more than 30 minutes.

PFAPA (periodic fever, aphthous stomatitis, pharyngitis, adenitis)

- may cause convulsions

Etiopathogenesis

The mechanism of febrile convulsions (FK) is still unclear. FK occur mostly at the **beginning of a febrile illness in the phase of rising temperature**.

The main etiological factors are fever, age and genetic predisposition – there is a positive family history in up to 30% of cases.^[2]

Classification

FK can be divided into **simple** (simple febrile seizures), **complicated** (complex febrile seizures) and **symptomatic** (symptomatic febrile seizures). We speak of symptomatic convulsions if they arise on the basis of an acute disease affecting the CNS (meningitis , encephalitis , sepsis) or in the case of a basic neurological disease or malformation of the CNS. ^[3]

diagnostic criteria	simple febrile convulsions	complicated febrile convulsions
age	6 months - 6 years	< 6 months or > 6 years
seizure duration	< 10 minutes, (in the US < 15 minutes)	> 10 minutes, (in the US > 15 minutes)
type of spasm	generalized tonic-clonic convulsions, hypotonic state with unconsciousness = febrile collapse (syncope)	topical convulsions - hemiconvulsions
post-seizure state	without symptoms	meningeal syndrome , symptoms of brain edema , changes in muscle tone, disorders of basic vital functions
family and personal history	insignificant	in RA epilepsy , in OA perinatal risks, CNS injuries, CNS infections, delayed psychomotor development , recent vaccination

Clinical picture

The typical manifestation is **generalized tonic-clonic convulsions**, in some cases the typical convulsive manifestations do not occur and the clinical manifestations have **the character of febrile syncope with impaired vegetative functions**. Children falling into the category of simple FK are healthy in terms of neurological and psychomotor development. They never had convulsions in the afebrile state.

FKs come most often during the initial rise in temperature. They are often the first manifestation of the disease at all, when convulsions warn that the child has an infectious disease. The temperature limit from which convulsions would start is not known. Based on experience, however, we can say that if the child has $< 38.0^{\circ}\text{C}$ per rectum, the probability of simple FK is low. However, it must be taken into account that the value of the measured body temperature can be affected by previous treatment with antipyretics. ^[3]

Differential diagnosis

- neuroinfection (acute viral or bacterial meningitis or meningoencephalitis);
- herpetic encephalitis - repeated convulsions, focal symptoms (focal/lateralized seizures, hemiparesis, cranial nerve involvement, visual impairment, aphasia) and persistent impairment of consciousness; pleocytosis in the cerebrospinal fluid (not always), focal abnormality on the EEG; signal changes on MRI; treatment: acyclovir iv;^[1]
- Dravet syndrome - repeated protracted and/or lateralized convulsions at temperature; genetically determined drug-resistant epilepsy);ref name="Necas2017" />
- convulsions that, although they arose during a febrile infection, but this is not the primary cause of their occurrence;
- febrile syncope (differential diagnosis is also complicated by the possible occurrence of convulsions during syncope);
- GEFS+ (generalized epilepsy with febrile seizure plus).

In the lowest age category, in addition to neuroinfection, metabolic defects and structural defects of the CNS must also be ruled out.

Diagnostic algorithm

- Clinical examination by a pediatrician - to rule out neuroinfection, to determine the cause of fever.
- Laboratory examination - according to the child's clinical condition.
- Lumbar puncture - with clinical or anamnestic signs of neuroinfection and in children who have already started antibiotic treatment (for the possibility of a mitigated course of neuroinfection).

Complicated FK:

- Neurological examination
- Electroencephalography (EEG)
- Eye background - at the discretion of the attending physician.
- Imaging of the CNS - as indicated by a pediatric neurologist. ^[1]

Therapy

Acute treatment: The administration of benzodiazepines as an acute treatment of FK is governed by the same rules as the treatment of epileptic seizures, i.e. they are indicated in the treatment of an attack usually longer than 2-3 min.:

- diazepam rectally: 5 mg (for children up to 15 kg of body weight); 10 mg (for children over 15 kg)
- diazepam iv: 0.5 mg/kg/dose (for children under 3 years), 0.3 mg/kg/dose (for older children)
- midazolam iv: 0.2 mg/kg/dose (for children under 3 years); 0.1 mg/kg/dose (in older children)
- midazolam IM: 0.25 mg/kg/dose.^[1]

Prophylactic administration of benzodiazepines at home at room temperature is NOT recommended (possibility of masking neuroinfection symptoms, frequent side effects, potential for overdose).^[1]

In uncomplicated febrile convulsions, in addition to general regimen measures, antipyretics are indicated:

- paracetamol 10-15 mg/kg for dose, max. 60 mg/kg for die po, pr
- ibuprofen 5-10 mg/kg for dose p.o., p.r

Antiepileptic therapy is not recommended in patients with simple febrile seizures.^[2]

Forecast

The risk of developing epilepsy after uncomplicated FK is comparable to the prevalence of epilepsy in the general population (approx. 1-2%). After complicated FK, this risk is higher (5-10%). The total risk for both types of FK is 2-4%. The prognosis of the vast majority of FK is therefore excellent. ^[1]

Uncomplicated febrile seizures are benign and generally have a very good prognosis. The risk of recurrence after febrile convulsions is 30% and after two or more episodes up to 50%. In children with simple febrile convulsions, there was no increased mortality or a higher incidence of focal neurological symptoms or mental retardation. The risk of developing epilepsy after simple febrile convulsions is only slightly higher than in the healthy population.

Links

Related Articles

- Impaired consciousness and seizures (pediatrics)
- Fever of unknown etiology

External links

- Febrile convulsions in children — interactive algorithm + test (<https://www.akutne.cz/algorithm/cs/219--/>)
- Febrile seizures 2019 — interactive algorithm + test (<https://www.akutne.cz/algorithm/cs/397--/>)
- Febrile convulsions (recommended procedure of the Society of Pediatric Neurology ČLS JEP, 2017) (http://www.detskaneurologie.cz/dokumenty/DP_febrilni_krece.pdf)
- Pediatrics for practice - Goldemund, K.: Febrile convulsions (<http://www.pediatricpropraxi.cz/pdfs/ped/2001/04/05.pdf>)

References

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2. KLIKOVÁ, K. FEBRILNÍ KŘEČE: DOPORUČENÝ POSTUP PRO VYŠETŘENÍ DÍTĚTE S NEKOMPLIKOVANÝMI FEBRILNÍMI KŘEČEMI. ADAPTOVANÝ DOPORUČENÝ POSTUP AMERICAN ACADEMY OF PEDIATRICS. *Čes-slov Pediat* [online]. 2017, y. 72, vol. 1, p. 63-67, Available from <<https://www.prolekare.cz/casopisy/cesko-slovenska-pediatric/2017-1/febrilni-krece-doporuceny-postup-pro-vysetreni-ditete-s-nekomplikovany-mi-febrilnimi-krecemi-adaptovany-doporuceny-postup-american-academy-of-pediatrics-60516>>.
3. HAVRÁNEK, Jiří: *Febrilní křeče*