Evaluation and treatment of children with new onset seizures

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Relativas a esta presentación existen las siguientes relaciones que podrían ser percibidas como potenciales conflictos de intereses:

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<th>Blaise Bourgeois, MD:</th>
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<td><strong>Contracted Research</strong></td>
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THE CHILD WITH NEW ONSET NONFEBRILE UNPROVOKED SEIZURE

1. Differential diagnosis of seizures
2. Classification of seizures/syndromes
3. Initial work-up
4. Decision to treat
5. Drug choice
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REASON FOR CLASSIFICATION

Diagnosis of seizure type or epilepsy syndrome may be helpful in determining:

1) Need for further evaluation
2) Prognosis
3) Choice of medication
International classification of epileptic seizures

I. GENERALIZED SEIZURES

1. Tonic-clonic
2. Tonic
3. Clonic
4. Atonic
5. Myoclonic (incl. myoclonic-atonic & myoclonic-tonic)
6. Absence: Typical, Atypical, Myoclonic absence, Eyelid myoclonia

II. SEIZURES THAT ARE GENERALIZED OR FOCAL

Epileptic spasms
International classification of epileptic seizures

III. FOCAL (PARTIAL, LOCAL) SEIZURES

1. Simple partial
   (no impairment of consciousness)

2. Complex partial
   (impairment of consciousness)
II. FOCAL (PARTIAL, LOCAL) SEIZURES

1. Focal sensory seizures
   a. Elementary
   b. Experiential

2. Focal motor seizures
   a. Elementary clonic
   b. Asymmetric tonic
   c. With typical automatisms
   d. With hyperkinetic automatisms
   e. With negative myoclonus
   f. Inhibitory

3. Gelastic seizures
4. Hemiclonic seizures
5. Secondarily generalized seizures
6. Reflex focal seizures
EPILEPSY SYNDROMES

**Neonatal period**
- Benign familial neonatal seizures
- Ohtahara syndrome (EIEE)
- Early myoclonic encephalopathy (EME)

**Infancy**
- Benign infantile seizures
- Benign familial infantile seizures
- Benign myoclonic epilepsy in infancy
- Migrating partial seizures of infancy
- West syndrome
- Severe myoclonic epilepsy (Dravet)
- GEFS+
EPILEPSY SYNDROMES

Childhood

• Benign epilepsy with centrotemporal spikes (Rolandic)
• Childhood occipital epilepsy
  1. Early onset (Panayiotopoulos) 2. Late onset (Gastaut)
• Childhood absence epilepsy
• Absence epilepsy with eyelid myoclonia (Jeavons)
• Epilepsy with myoclonic absences (Tassinari)
• Lennox-Gastaut syndrome
• Epilepsy with myoclonic atonic seizures (Doose)
• Landau-Kleffner syndrome and ESES (CSWS)
• Aut. Dom. Noct. Frontal lobe epilepsy (ADNFLE)
EPILEPSY SYNDROMES

Adolescence - Adulthood

• Juvenile absence epilepsy (JAE)
• Juvenile myoclonic epilepsy (JME)
• Idiopathic epilepsy with GTC seizures
• Progressive myoclonic epilepsies (PME) (Unverricht-Lundborg, Lafora)

Distinctive Constellations

• Mesial temporal lobe epilepsy with hippocampal sclerosis
• Rasmussen syndrome
• Gelastic seizures with hypothalamic hamartoma
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EVALUATION OF THE FIRST AFEBRILE SEIZURE

1. History
2. Examination
3. Partially sleep deprived awake and asleep EEG
4. Neuroimaging: MRI
5. Other lab tests
1. **History**
   
a. Detailed seizure history:  
elicit details, timing, circumstances, triggers, aura, focality, incontinence, vomiting, patient’s recollection, postictal deficit (aphasia, Todd’s paresis)

b. Patient’s past history:
   
   Pre-, peri-, postnatal, development

c. Family history
EVALUATION OF THE FIRST AFEBRILE SEIZURE

2. Examination

General: skin, eyes, dysmorphic features

Neurological
EVALUATION OF THE FIRST AFEBRILE SEIZURE

3. EEG

ALWAYS!!

Partially sleep deprived, awake and asleep

Consider: ambulatory EEG, video EEG
The diagnostic yield of a second EEG after partial sleep deprivation: a prospective study in children with newly diagnosed seizures

Carpay JA et al., Epilepsia 1997;38:595-599

- 552 children, 1 m – 16 yrs old
- ≥1 seizure, idiopathic or remote symptomatic

Epileptiform activity (EA)

- 552 standard EEGs: 56%
  (20% with sleep)
- 177 Repeat EEGs after partial sleep deprivation: 34.5%
  (81% with sleep)
EVALUATION OF THE FIRST AFEBRILE SEIZURE

4. Neuroimaging: MRI

**Urgent:**
No return to baseline or Todd’s paresis for several hours

**Nonurgent:** < 1 year: Always
> 1 year: Always except if history and EEG typical of:
Benign epilepsy with centrotemporal spikes
Childhood absence epilepsy
Absence epilepsy with eyelid myoclonia (Jeavons)
Epilepsy with myoclonic absences (Tassinari)
Juvenile absence epilepsy (JAE)
Juvenile myoclonic epilepsy (JME)
EVALUATION OF THE FIRST AFEBRILE SEIZURE

5. Other lab tests: if etiology remains unknown

**Lumbar puncture**: especially in infants or metabolic disorder

Order: glucose (+ serum glucose, consider SCL2A1), lactate, pyruvate, amino acids, neurotransmitters, tetrahydro- and neopterin

**Tests for other treatable causes:**

Ammonium, serum amino acids, guanidinoacetate, biotinidase, pyridoxine trial (or ALDH7A1 DNA mutation)
EVALUATION OF THE FIRST AFEBRILE SEIZURE

5. **Other lab tests (cont’d):** if etiology remains unknown

**Consider:** DNA microarray, MECP2/CDKL5/STK9, CDG, Consultations (Ophthalmology, Genetics and Metabolism)

**Special clinical situations:**
- Early onset absence epilepsy (<3 years): LP, SLC2A1
- Suspicion of Dravet or GEFS+: SCN1A
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DECISION TO TREAT NEW ONSET SEIZURES

1. What is the risk of recurrence?
2. Does early treatment influence outcome?
3. What are the risks associated with treatment?
4. What is the patient’s age, occupation and preference?
Recurrence following first unprovoked seizure

A meta-analysis of 16 studies

Risk of recurrence

Overall at 2 years 42%

Idiopathic + normal EEG 24%

Remote symptomatic + epileptiform EEG 65%

Berg & Shinnar, 1991
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A. **Partial seizures** (with or without secondary generalization)

First choice: Oxcarbazepine, levetiracetam

Second choice: Lamotrigine, valproate (male), pregabalin

Third choice: Lacosamide, topiramate, zonisamide, phenytoin,

Consider: Tiagabine, phenobarbital, primidone, benzodiazepine
DRUG CHOICES BY SEIZURE TYPES AND EPILEPSY SYNDROMES

B. Generalized tonic-clonic seizures

First choice: Levetiracetam, lamotrigine, valproate (male)

Second choice: Topiramate, oxcarbazepine, phenytoin

Third choice: Zonisamide, phenobarbital, primidone
C. Childhood absence epilepsy

Before age 10 years:
First choice: Ethosuximide, valproate (if convulsions)
Second choice: Valproate, lamotrigine
Consider: Methsuximide, benzodiazepine, levetiracetam, topiramate, zonisamide, acetazolamide
D. Juvenile absence epilepsy

After age 10 years:

First choice: Females: Lamotrigine (+/- ethosux)

Males: valproate

Second choice: Lamotrigine, ethosuximide (add-on)

Third choice: Methsuximide, levetiracetam, topiramate, acetazolamide, zonisamide, benzodiazepine
E. Juvenile myoclonic epilepsy

First choice: Females: Levetiracetam, lamotrigine
Males: Valproate

Second choice: Levetiracetam, lamotrigine, topiramate, clonazepam (add-on)

Third choice: Zonisamide, phenobarbital, primidone
F. Lennox-Gastaut and related syndromes

First choice: Topiramate, lamotrigine

Second choice: Rufinamide

Third choice: Valproate, ketogenic diet, clobazam, felbamate, zonisamide

Consider: Phenobarbital, VNS, ethosuximide, methsuximide, steroids, levetiracetam
G. Infantile spasms

First choice: ACTH / prednisolone (cryptogenic)
vigabatrin (lesional, TSC)

Second choice: Valproate, topiramate,
zonisamide, benzodiazepines,
ketogenic diet

Consider: Rufinamide, pyridoxine,
levetiracetam, lamotrigine,
felbamate, surgery
H. **Benign epilepsy of childhood with centrotemporal spikes**

First choice: Sulthiame, gabapentin

Second choice: Levetiracetam, oxcarbazepine, valproate

Consider: Lamotrigine, topiramate, zonisamide, pregabalin, lacosamide