Benign Childhood Epilepsy
Identifying epilepsies a child might “outgrow”

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Objectives

• Review patient features, seizures types, and diagnostic evaluation which identify benign epilepsy syndromes of childhood
• Discuss therapeutic strategies and prognosis of recognized benign childhood epilepsy syndromes
• Highlight features that may suggest an atypical evolution
Classification of Epilepsy

• Those with cause not likely to remit – symptomatic
• Those without known cause – cryptogenic
• Those of presumed genetic origin with fairly benign prognosis – idiopathic (age-limited syndromes)
  • Typically normal developing children
  • More often have family history of similar age related seizures
  • More commonly report histories of febrile seizure
  • Seizures are often rare and easily controlled with treatment
Characteristics of a Syndrome

- Age at onset of seizures
- Types of seizures
- Evolution of symptoms
- EEG findings
- Associated interictal signs and symptoms
- Pathophysiologic mechanism
- Anatomic substrate
- Genetic basis
Why Syndromes?

The recognition of epilepsy syndromes helps providers:

• make correct diagnosis
• carry out appropriate diagnostic testing
• provide more accurate prognostic counseling
• choose efficacious treatments
• communicate with other providers

• Epilepsy syndromes are a dynamic concept - evolving with time, technology, and treatments.
• Epidemiologic studies and medication trials are limited by such an evolution
Benign Childhood Age-Related Seizure Syndromes

- Benign Familial and Non-familial neonatal seizures
- Febrile Seizures
- Myoclonic Astatic Epilepsy
- Benign Myclonic Epilepsy
- Panayiotopoulos Syndrome
- Childhood Absence Epilepsy
- Benign Rolanic Epilepsy
- Gastaut Type Occipital Epilepsy

Years:
- 0
- 10
- 20
Syndromes of Neonates

**Benign Neonatal Epilepsy (non-familial)**

- **Presentation:** single episode of repetitive, but lengthy, seizures or status epilepticus
- **Age at onset:** First week of life
- **Seizure Types:** Unilateral clonic seizures involving the face and limbs which may alternate side. They may occur over 1-3 minutes in repetitive intervals or evolve to status epilepticus with total duration of 2h-3days
Syndromes of Neonates

**Benign Neonatal Epilepsy (non-familial)**

- **Diagnostic Evaluation**: typical neonatal evaluation (i.e. EEG, MRI, electrolytes, infectious workup, genetics, etc.)

  All evaluation, except EEG, should be normal.

- **EEG**: theta pointu alternant pattern – runs of theta with intermixed sharp waves of alternating side. Ictal manifestations include rhythmic rolandic spikes.
Syndromes of Neonates

**Benign Neonatal Epilepsy (non-familial)**

- **Etiology:** unknown
- **Prognosis:** most often normal development with rare (0.5%) occurrence of febrile/afebrile seizures
- **Treatment:** Remission is spontaneous despite therapy. Benzos, phenobarbital, phenytoin amongst others may shorten seizure.
- **Pitfalls:** excluding other etiologies
Syndromes of Neonates

**Benign Familial Neonatal Epilepsy**

- **Presentation**: Multiple brief seizures lasting 1-2 min occurring multiple times per day
- **Age at onset**: first week of life
- **Seizure Types**: Typically tonic with apnea, ocular manifestations, or autonomic symptoms
Syndromes of Neonates

Benign Familial Neonatal Epilepsy

• **Diagnostic Evaluation**: typical neonatal evaluation (i.e. EEG, MRI, electrolytes, infectious workup, genetics, etc.)
  All evaluation, except EEG and genetic testing, should be normal.

• **EEG**: varies. Normal, discontinuous, focal, generalized and theta pointu alternant pattern may be present.
Syndromes of Neonates

**Benign Familial Neonatal Epilepsy**

- **Etiology:** autosomal dom mutation in voltage-gated K channel (KCNQ2-chrom 20, KCNQ3-chrom 8)
- **Prognosis:** Remission within 1-6 months from onset. 10-14% may develop later febrile or afebrile seizures
- **Treatment:** Benzos, phenobarbital, phenytoin and other AEDs may shorten or terminate seizures
- **Pitfalls:** excluding other causes of neonatal seizure
Syndromes of Infancy

**Febrile Seizures**

- **Presentation:** Seizure in the setting of fever
- **Age at onset:** 6 months – 5/6 years
- **Seizure types:** GTCS (80%), tonic (13%), focal tonic clonic (4%), and atonic (3%)
- **Simple:** <15 min, generalized, no recurrence in 24 h
- **Complex:** >15 min, focal, recurrent
- **Febrile status epilepticus**
Syndromes of Infancy

Febrile Seizures

• **Diagnostic evaluation**: none is necessary if the diagnosis is clear

• **EEG**: often normal and not of diagnostic use in clear cases

• **Etiology**: genetic with multiple loci identified involving sodium channel and GABA receptors
Syndromes of Infancy

Febrile Seizures

• **Prognosis:** Recurrence is common occurring once in 32%, twice in 15%, and >2 in 7%.

• Overall risk of subsequent afebrile seizures is 3% with those with complex febrile seizures or febrile status at higher risk.

• **Pitfalls:** Failing to recognize Dravet syndrome, GEFS+ or “seizures in the setting of fever”
Benign Infantile Seizures (Watanabe-Vigevano syndrome)

• **Presentation:** clusters of seizures (5-10 per day) occurring over 1-3 days which may recur in 1-3 months

• **Age at onset:** 3-20 months

• **Seizure types:** motor arrest, decreased response, stare, eye/head deviation and unilateral clonus which may alternate sides
 Syndromes of Infancy

Benign Infantile Seizures (Watanabe-Vigevano syndrome)

• **Diagnostic evaluation:** routine workup including MRI/EEG.
• **EEG:** interictal normal. Ictal with focal onset from any region
• **Etiology:** Familial form linked to 19q12-13.1, 2q24, and 16p12-q12
Syndromes of Infancy

Benign Infantile Seizures (Watanabe-Vigevano syndrome)

- **Prognosis**: remission in 1-2 years. May present with several clusters of seizures over the infantile period
- **Treatment**: Usually easily controlled with most AEDs
 Syndromes of Infancy

Benign Myoclonic Epilepsy in Infancy

• **Presentation**: Primarily brief myoclonic jerks
• **Age at onset**: 6m-3y
• **Seizure types**: myoclonic seizure primarily in small clusters, more frequent in drowsiness and sleep. Febrile seizures (20%) and GTC (20%) may also occur
 Syndromes of Infancy

Benign Myoclonic Epilepsy in Infancy

• **Diagnostic evaluation:** all test other than eeg are normal
• **EEG:** interictal is normal. Ictal eeg shows generalized spike/polyspike slow wave with myoclonic jerk. May be photic or stimulus induced.
• **Etiology:** presumed genetic
Syndromes of Infancy

**Benign Myoclonic Epilepsy in Infancy**

- **Prognosis**: remission between 6m-5y, though 10-20% may develop rare GTCS in early teens. Development most often normal.
- **Treatment**: Valproate, clonazepam, levetiracetam with withdrawal 3-5 years after onset.
- **Pitfalls**: differentiating this from other etiologies of myoclonic seizures in infancy.
Syndromes of Early Childhood

**Myoclonic Astatic Epilepsy of Doose**

- **Presentation**: Toddler with onset of brief head knods or sudden falls
- **Age of Onset**: 6m-6y (peak 2-4 y)
- **Seizure Types**: Myoclonic astatic primarily, atonic, and absence rarely. Rare febrile/afebrile GTC prior to myoclonic seizure onset.
Syndromes of Early Childhood

Myoclonic Astatic Epilepsy of Doose
Syndromes of Early Childhood

Myoclonic-Astatic Epilepsy of Doose

Diagnostics: all testing other than EEG is normal

Criteria:

- Normal development prior to seizure onset with normal MRI.

- Myoclonic, myoclonic-atonic, or atonic seizures between 6m-6years

- Normal EEG background with generalized 2-3Hz spike/polyspike slow wave discharges

- TONIC seizures are exclusionary
Myoclonic-Astatic Epilepsy of Doose

**Etiology:** Possibly genetically determined, many with family history

**Prognosis:** 50% become seizure free with normal development, the remainder continue to seize with cognitive/behavioral abnormalities

**Treatment:** AEDs based on seizure type. Carbamazepine, phenytoin, oxcarbazepine and vigabatrin are contraindicated

**Pitfalls:** differentiating from progressive myoclonic epilepsies, Dravet syndrome, LGS, or benign myoclonus
Benign Rolandic Epilepsy

**Presentation:** School aged child with isolated seizures occurring primarily from sleep

**Age at onset:** 7-10 yrs

**Seizure Types:** Characterized by infrequent, often single/nocturnal, focal seizures of unilateral facial sensorimotor symptoms, oropharyngolaryngeal manifestations, speech arrest, or hypersalivation
 Syndromes of Early Childhood

Benign Rolandic Epilepsy
Syndromes of Early Childhood

**Benign Rolandic Epilepsy**

**Diagnostics:** all normal except EEG. MRI not necessary in typical cases

**EEG:** Unilateral or bilateral centrotemporal spikes accentuated by sleep.

**Etiology:** genetically determined
Syndromes of Early Childhood
Syndromes of Early Childhood

**Prognosis:** Seizures usually remit within 2-4 yrs, nearly all by 16 yrs of age.

**Treatment:** Most AEDS, though may not require treatment if seizures are rare

**Pitfalls:** Failing to recognize atypical EEG features (i.e. slowing, altered spike morphology). Failure to recognize atypical course with linguistic/cognitive declines.
Syndromes of Early Childhood

Panayiotopoulos Syndrome

Presentation: School age child with mainly autonomic, prolonged, and isolated seizures

Age at onset: 4-5 yrs

Seizure Types: Seizures usually begin with autonomic manifestations (emesis), followed by behavior changes (restlessness, agitation, quietness), ictal syncope (unresponsiveness with loss of tone) and more conventional seizure manifestations many lasting >30 minutes
Syndromes of Early Childhood

**Panayiotopoulos Syndrome**

**Diagnostic evaluation:** all testing other than EEG is normal

**EEG:** variable patterns of often multifocal, high amplitude spike or sharp/slow wave complexes more often posterior in location

**Etiology:** genetically determined
Syndromes of Early Childhood

Panayiotopoulos Syndrome

Prognosis: Remission in 1-2 years from onset. 1/3 have one seizure, ½ have 2-5 seizures, rarely do patients have >10

Treatment: Benzos for prolonged seizures. Rarely are maintenance AEDs necessary

Pitfalls: must differentiate from other etiologies presenting with autonomic status epilepticus (typically abnormal exam, eeg background, or imaging)
Syndromes of Early Childhood

**Childhood Absence Epilepsy**

**Presentation:** school age child with multiple, brief abrupt pauses in activity/speech

**Age of onset:** 2-10 yrs, peak 5-6 yr

**Seizure Types:** Typical Absence seizures, occurring 10-100s per day, lasting 5-20 seconds
Syndromes of Early Childhood

Childhood Absence Epilepsy

Diagnostic evaluation: only eeg is necessary in typical cases

EEG: Generalized 3Hz spike wave

Etiology: genetically determined, multifactorial
Syndromes of Early Childhood
Syndromes of Early Childhood

**Childhood Absence Epilepsy**

**Prognosis:** remission before 12 yrs of age

**Treatment:** Ethosuximide, Valproic Acid, Lamotrigine

**Pitfalls:** Early onset absence, absences associated with perioral/eyelid myoclonia, late onset absence
Gastaut-Type Occipital Epilepsy

**Presentation:** Late childhood or adolescent with seizures of occipital semiology

**Age of onset:** 3-15 yrs

**Seizure Types:** Onset of positive visual phenomena or blindness rarely terminating in hemi/generalized convulsion
Syndromes of Early Childhood

**Gastaut-Type Occipital Epilepsy**

**Diagnostic evaluation:** all tests other than EEG are normal. MRI is probably required.

**EEG:** Occipital spikes with “fixation-off” phenomenon

**Etiology:** likely genetically determined
 Syndromes of Early Childhood
Syndromes of Early Childhood

**Gastaut-Type Occipital Epilepsy**

**Prognosis:** Less clear, though remission 2-4 years from onset in 50% of patients

**Treatment:** Carbamazepine

**Pitfalls:** Important to differentiate from symptomatic occipital epilepsies
Conclusions

• Children are uniquely susceptible to a variety of age-related benign seizure syndromes

• These syndromes tend to occur in otherwise normal children, with often rare or easily treated seizures, in the setting of specific historical and diagnostic (i.e. EEG) data

• The etiologies are presumed genetic and multifactorial for many
Conclusions

- Treatment is usually efficacious, but not necessary in several of the syndromes because of the rarity of seizures.
- Prognosis is invariably good, though some syndromes may evolve to unfavorable outcomes (and likely represent another syndrome).
- No syndrome is absolute in prognosis and we must be diligent to recognize atypical evolution of symptoms.