Epilepsy and Epileptic Seizures

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Epilepsy

• Spontaneously recurring epileptic seizures

• One of most common CNS diseases

• Prevalence: 0.5-1%
  – Czech Rep. = 70 000 patients

• Incidence: 50 newly diagnosed/100 000/y
  – Czech Rep. = 5000/year
Incidence of epilepsy

Hauser WA, et al. Epilepsia 1993
Epileptic seizure

• Symptom of brain functional impairment
  – acute
  – chronic

• Usually short transient change in clinical status caused by pathological
  – increase in neuronal excitation
  – decrease in neuronal inhibition
  – neuronal hypersynchrony
Diagnosis

Steps

• Differentiation of nonepileptic events
• Seizure classification
• Epilepsy classification
  – Etiology
Nonepileptic Events

• Somatic
  – SYNCOPE
  – TIA, migraine, transient global amnesia, metabolic disorders

• Psychogenic
  – DISSOCIATIVE („Pseudoseizures“)
  – Panic attack
Syncope
Differentiation from Epileptic Seizure

• Onset
• Autonomic signs
• Injury
• Incontinence
• Motor activity – convulsive syncope
<table>
<thead>
<tr>
<th></th>
<th>Syncope</th>
<th>Seizure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body position</td>
<td>Vertical</td>
<td>Independent</td>
</tr>
<tr>
<td>Prevalence</td>
<td>Awake</td>
<td>Awake/Sleep</td>
</tr>
<tr>
<td>Color</td>
<td>Pale</td>
<td>Cyanotic</td>
</tr>
<tr>
<td>Aura</td>
<td>Presyncopal</td>
<td>Specific</td>
</tr>
<tr>
<td>Confusion</td>
<td>Short</td>
<td>Prolonged</td>
</tr>
<tr>
<td>Automatisms</td>
<td>Absent</td>
<td>May occur</td>
</tr>
<tr>
<td>EEG</td>
<td>Normal</td>
<td>Abnormal</td>
</tr>
<tr>
<td></td>
<td>Psychogenic</td>
<td>Epileptic</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>Age of onset</strong></td>
<td>Younger</td>
<td>Whenever</td>
</tr>
<tr>
<td><strong>Provocation</strong></td>
<td>Situation</td>
<td>Different</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>Often &gt;5 min.</td>
<td>Usually &lt;3 min.</td>
</tr>
<tr>
<td><strong>Motor behavior</strong></td>
<td>Irregular</td>
<td>Stereotype</td>
</tr>
<tr>
<td></td>
<td>Asynchronous</td>
<td>Synchronous</td>
</tr>
<tr>
<td></td>
<td>Eyes hold shut</td>
<td>Eyes open</td>
</tr>
<tr>
<td></td>
<td>Opistotonus</td>
<td>Automatisms</td>
</tr>
<tr>
<td><strong>Prevalence</strong></td>
<td>Awake</td>
<td>Awake/Sleep</td>
</tr>
<tr>
<td><strong>Incontinence</strong></td>
<td>+/-</td>
<td>+/-</td>
</tr>
<tr>
<td><strong>Injury</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hyperventilation Attacks

- Provoked hyperventilation
  - Pain, anxiety, psychogenic component
- Mouth and hands paresthesia
- Hands and feet spasm – tetany
- Tx - verbal, drugs
  - Breathing into (paper) bag
- Other causes of tetany
  - ↓ Ca, ↓ Mg
Epileptic Seizure

• Acute symptomatic (provoked) – aetiology
  – Cerebral – head injury, stroke, mass lesion, encephalitis
  – Extracerebral – metabolic disorder, electrolyte dysbalance, drugs, alcohol/drugs withdrawal

• Recurrent unprovoked - EPILEPSY
• Isolated unprovoked - EPILEPSY?
Classification

• SEIZURES
  • Type
    – Description
  • EEG (interictal)

• EPILEPSIES
  • Overall clinical impression
  • History
  • Seizure type
  • EEG
  • Imaging
Seizure Classification

- ILAE 1981
  - Simple Partial (SPS)
    - Consciousness fully preserved
  - Complex Partial (CPS)
    - Consciousness impaired
  - Generalized
    - Primary or secondary

- ILAE 2010
  - Focal x Generalized
Focal seizures

- Originating in a restricted area of the brain (cortex)
- Spread of the epileptic activity to other brain areas
Seizure Evolution

Simplex Partial $\rightarrow$ Complex Partial $\rightarrow$ Generalized

- Postparoxysmal period
  - Hemiparesis? Alteration? Aphasia?
Generalized seizures

• Both hemispheres involved at the seizure onset
Generalized Seizures

- Absence
- Myoclonic
- Clonic
- Tonic
- Tonic-clonic (GTCS)
- Atonic
Classification

- **SEIZURES**
  - Type
    - Description
  - EEG (interictal)

- **EPILEPSIES**
  - Overall clinical impression
  - History
  - Seizure type
  - EEG
  - Imaging
Classification of Epilepsies and Epileptic Syndromes

- ILAE 1989

- Focal, Localization-related
  - Focal brain disorder

- Generalized
  - Diffuse disorder
Classification of Epilepsies and Epileptic Syndromes

- Idiopathic – Genetic
- Symptomatic – Structural or metabolic
- Cryptogenic – Unknown aetiology
Hippocampal sclerosis

T1 – atrophy

T2, FLAIR – increase in signal intensity
Ganglioglioma
Cavernoma
Focal cortical dysplasia
Prophylaxis

- No prove of prophylactic effect of antiepileptic drugs on development of posttraumatic epilepsy

- Similar results for other symptomatic epilepsies
Therapy

• Life style
  – Elimination of risk
  – Elimination of triggers

• Antiepileptic drugs (AEDs)
Therapy

• Choice of AED
• Titration
• Outcome – efficacy
  – Epilepsy type dependent
  – 70% seizure free
  – 30% drug resistant (refractory)
• Discontinuation
Antiepileptic Drugs

• 1. generation = old AEDs
  – phenobarbital, primidone, phenytoin, ethosuximide

• 2. generation
  – carbamazepine, valproate

• 3. generation = new AEDs
  – lamotrigine, levetiracetam ... and others
Choice of AED

• Efficacy
  – Type of seizure/syndrome

• Patient profile
  – Personal history
    • Comorbidities, Comedication
  – Physical status
  – Anticipation
Emergency

- 1st seizure
- Cluster of seizures
- Status epilepticus
First Aid

• During seizure
  – simple partial
  – complex partial
  – generalized convulsive

• Following the seizure
Status Epilepticus

• Definition
  – Historical
    • seizure activity lasting 30 minutes without pt. regaining full consciousness between seizures
  – New
    • seizure lasting longer than 5 minutes = low chance for spontaneous termination
    • 2nd seizure within 30 minutes without regaining full consciousness between seizures
Treatment

• Airways
  – Obstruction
  – Head position

• Oxygen

• IV line - laboratory testing
  – Blood sugar

• Vital signs monitoring
Therapy

• Diazepam 10-20 mg IV or rectal
  – Repeat if effective after 10-15 minutes
  – Hypotension, respiratory failure

• Alternatively
  – Midazolam (Dormicum) 5-15 mg IV or IM or buccal
  – Clonazepam (Rivotril) 1-2 mg IV

• Phentyoin 15-20 mg/kg IV = +/- 4 amp.
  – Slow saturation ! - 50 mg/min - ECG monitor

• Phenobarbital, Valproate, Levetiracetam
Epilepsy and Pregnancy

• Higher risk for mother and child (fetus)
  – Seizures
  – Teratogenicity

• Most epilepsy women have
  – Normal pregnancy and delivery
  – No change in seizure frequency

• Breast feeding generally not contraindicated
Psychiatric Comorbidities and Psychosocial Aspects

- Psychiatric comorbidity
  - Anxiety, depression, psychosis

- Stigma of having epilepsy
- Employment issues
- Driving
- Therapeutic outcome
  - Seizure frequency
  - Seizure-free period