Clinical Scenario

• A mother brings her two year old son to the office because he is having frequent seizures.

• He has tuberous sclerosis and is on chronic phenobarbital orally. His mother reports that he has been having symmetric jerking of both arms and legs four times in the last two hours. She thinks each episode has lasted 10 to 15 minutes. The last episode occurred about 30 minutes ago.

• The child has had URI symptoms for the last two days. Prior to today, he had been eating and drinking a little less than normal. He has had a fever (not measured) for the last two days.

• The child just recently began to walk. He says “mama” and “dada” but no other words.
Clinical Scenario

• Physical exam
  – The child has a temp of 40 C. His heart rate is 145. His respiratory rate is 24 with normal respiratory effort.
  – He has clear rhinorhea. He has coarse transmitted upper airway rhonchi in both lung fields. He is warm and well perfused. He has no murmurs. His capillary refill is 2 seconds. He has normal bowel sounds. His abdomen does not appear tender to palpation.

• As you turn to address the mother regarding the physical finding, the child has a generalized tonic clonic seizure involving all four extremities. He has peripheral and perioral cyanosis with grunting respiratory effort.

Status Epilepticus: Definition

• Status epilepticus is a seizure lasting 30 minutes or longer or two or more seizures without recovery of consciousness between them.
Status Epilepticus

• More than 50% of episodes occur in children less than 3 years of age

• One third of presentations are the initial presentation of epilepsy in a child

• One third occur in children with known epilepsy

• One third occur in children with an isolated brain injury (traumatic or non traumatic)

Causes of Status Epilepticus in Children

• Summary of 20 studies covering 2093 children and adolescents (excludes neonates)

  – Acute symptomatic cause 26%
  – Remote symptomatic cause 33%
  – Remote symptomatic cause with acute precipitant 1%
  – Progressive encephalopathy 3%
  – Febrile status epilepticus 22%
  – Cryptogenic 15%
Causes of Status Epilepticus in Children

- Fever, infection (non CNS)
- Head trauma
- Hypoxia/ischemia
- Vascular events (strokes, avm’s)
- Toxic ingestions
- CNS infections
- Tumor
- Metabolic diseases
- In child with epilepsy
  - Noncompliance with medications
  - Changes in metabolism of medications

Status Epilepticus: History

- Recent fevers, infection exposures
- Possible trauma
  - Be mindful that caregiver might not be aware of all potential trauma
- Toxic agents available to child
  - Prescription medications, ethanol
- History of any “funny” events
  - Unexplained twitching, turning blue, frequent staring, eye blinking
- Family history of metabolic problems
**Status Epilepticus: Brief Exam**

- Airway open or obstructed; difficulty with secretions?
- Depth of respirations, adequacy of tidal volumes
- Cyanosis
  - Generalized or peripheral?
- Neuro exam
  - Eye position, facial movement, movement of extremities

**Status Epilepticus: Interventions**

- Open airway as able, clear secretions
- Position on side if respirations judged adequate
- If respirations inadequate, augment with bag/mask ventilation
- Obtain IV access if able
- Check glucose, send electrolytes, CBC
- If patient known to be on anticonvulsants, send levels
- Send toxicology screens if suspicion of ingestion
- Give glucose if glucose < 60mg/dL
- Give thiamine 100 mg IV if adolescent
Diagnostic Studies

- CBC with diff
  - One seizure causes spike in WBCs and PMNs

- Electrolyte panel
  - Rarely positive findings

- Blood culture
  - If concern for serious infection

- Lumbar puncture
  - If concern for CNS infection
  - Airway maintenance and seizure control are higher priority

- Neuroimaging
  - Done only after child is stabilized

Status Epilepticus: Interventions - Medications

- If no IV access
  - Rectal diazepam 0.5 mg/kg/dose (max 10 mg)
  - If necessary, repeat dose to maximum 20 mg
  - Onset of action of rectal diazepam is typically 5-10 minutes

- If rectal gel of diazepam is available
  - Dose is 0.2 – 0.5 mg/kg/dose
  - Maximum
    - 5 mg if patient < 5 years
    - 10 mg if patient > 5 years

- If IV available
  - Lorazepam 0.1 mg/kg/dose, up to maximum of 4 mg IV
**Status Epilepticus: Interventions - Medications**

- Midazolam is option as intramuscular agent or IV agent
  - Dose is 0.2 mg/kg/dose IM or 0.1 mg/kg/dose IV
  - Midazolam has a very short half life
  - Can also be given via buccal administration
    - Use 5 mg/mL concentration, giving 0.5 mg/kg in buccal pouch

- If IV available may also use
  - Fosphenytoin 20 mg PE/kg as loading dose (1.5 PE = 1 mg phenytoin)
  - Give at rate of 3 PE/kg/min (max 150 PE/min)
  - Fosphenytoin is a neutral solution, it may be given IV and IM
  - Seizure control takes hours after IM dosing

**Status Epilepticus: Interventions - Medications**

- If fosphenytoin unavailable, may give phenytoin 20 mg/kg IV as loading dose

- Phenytoin takes longer to control seizures

- Phenytoin is a highly alkaline solution
  - Make certain of IV access if giving IV
  - Do not give intramuscularly

- Phenytoin precipitates in glucose
  - Make certain IV is flushed with saline before giving phenytoin
Status Epilepticus: Interventions - Medications

- A long acting agent should always be used if a short acting benzodiazepine is used for initial control

- Midazolam may be used as a continuous drip for longer term control
  - Typical rate of administration is 0.1 mg/kg/hr
  - Higher doses may be necessary

- Benzodiazepines do not typically cause enough respiratory depression to precipitate respiratory arrest unless they are used in combination with sedatives (barbiturates)

- Levetiracetam 20 mg/kg as IV loading dose is another drug that may be used if IV access available.
  - Quite expensive

- Valproic acid is another potential IV choice if control is not obtained
  - Dose is 20 – 40 mg/kg IV as loading dose
  - Continuous drip with doses ranging from 1-5 mg/kg/hr have been used after loading (usually starting with higher dose and titrating down after seizure control is achieved)
Status Epilepticus: Interventions

- Very difficult to intubate patient with tonic clonic seizures
- If patient is judged to need intubation
  - Rapid sequence intubation should be done
  - Airway is better visualized and less airway trauma results
- Avoidance of use of sedating drugs in control of seizures, particularly combinations of sedating drugs (benzodiazepines and barbiturates in combination) will make need for intubation less likely

Status Epilepticus - Summary

- Status epilepticus is more common in early childhood (under 3 years of age) than at any other time in life
- Airway and respiratory support and control of the seizures have the high priorities
- Lumbar punctures and neuroimaging may be delayed until seizures controlled and child is stable
- Benzodiazepines typically used as first line therapy
  - Fosphenytoin, levetiracetam, valproic acid are second and third line drugs
- If child needs airway secured
  - Use rapid sequence intubation technique
  - Do not try to intubate actively seizing patient
Cleveland Clinic

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