

SEIZURES

CLINICAL PEARLS

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Clinical Pearls

- Use Lorazepam as 1st drug for status NOT Valium
- Use Fosphenytoin IV rather than Dilantin
- Keppra/ Midazolam 3rd drug
- Keppra/Midazolam IV-4th drug
- Vimpat is reasonable option for 5th drug
- Don't give Depacon if you've already given phenytoin)
- Know difference between myoclonus and status
- Use Depakote/Keppra for J.M.E
- If status is from Aminophylline, give big doses of Benzodiazapine
- Lamotrigine is a very effective drug but you must titrate slowly...watch for rash
- Topamax can be used for status, but it is a better long term drug

Status Epilepticus

Definition: A status in which a patient suffers a series of seizures without fully recovering consciousness between these seizures.

Continuous clinical or electrical seizures lasting at least 30 minutes even if consciousness is not impaired.

I.C.E.S.: Any type of seizure that "persists for a sufficient length of time or is repeated frequently enough that recovery between seizures does not occur"

Incidence

- Approximately 60,000/year
- Approximately 800/year in Oklahoma
- Approximately 250/year in metro area
- Approximately 25/year at SWMC
- Approximately 15/year in Jackson County
- 10% of these patients who develop epilepsy present with status
- 15% of patients with epilepsy experience status at least once

Status Epilepticus

- More than 50% of people who develop status have no history of epilepsy
- Partial status → non convulsive
- Tonic clonic → convulsive
- Korsakoff's psychosis can result from partial status

Pathophysiology

- Most seizures terminate within 3 minutes
- Accumulation of extracellular K⁺ which increases susceptibility of small neuronal pool to repeated and continuous depolarization's, which causes oscillating paroxysms between cortex and subcortical areas.

Angina of the Brain

All of this occurs at a time when neuronal pools have very high metabolic demands – 2 to 3 fold increase in oxygen need.
 “Angina of the brain.”

How early do irreversible changes occur in status?

- Melorum 83' monkey studies
- 15 minutes – none
- 20 minutes – some
 - Light microscopy
 - Electron microscopy

Probably due to toxic effects of neurotransmitters

Guidelines for Treatment

- Have a plan
- Treat IV
- Therapeutic endpoint is cessation of seizure
- Be prepared to ventilate
- Use Adequate Doses

Drug Treatment

- What to avoid
- Narcotics
 - Phenothiazines
 - Paralyzing agents
 - Avoid IM

Drug Treatment

VALIUM

- Fast (1 - 3 minutes)
- Duration 15 – 30 minutes
- CNS depressant
- ↓ BP
- ↓ Respirations

Drug Treatment

LORAZEPAM

- Dose 0.1mg/kg (7mg in 70kg man)
- Onset 6 - 10 minutes
- Duration 12 - 24 hours
- Refractoriness frequently occurs

Drug Treatment

DILANTIN

Onset 10 – 30 minutes
 Old rate 50mg/min
 Give 15-20 mg/kg
 Duration 24-36 hours
 May ↓ BP
 May ↓ Heart Rate

Drug Treatment

NEW DILANTIN – FOSPHENYTOIN

Give IV or IM
 Non toxic/no tissue toxicity
 Immediately converted to Phenytoin
 IV: 15 minutes
 IM: 2 hours

When all else fails...

Midazolam (Versed)
 The third drug of choice

Dose:

Keppra

- 1500 IV – therapeutic levels in 15 minutes
- No Hepatotoxicity ↓ dose in renal failure

Drug Treatment

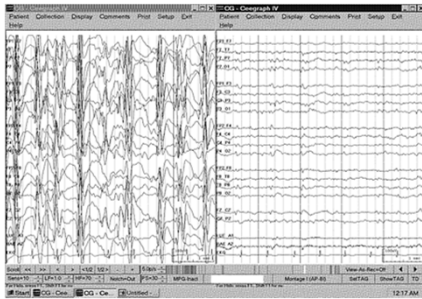
- IV Valproic acid (Depacon)- the dose is 25mg/kg followed by 500mg IV q 6 hours.
- The effectiveness of Depacon depends on early administration
- Try not to combine Depakote and Dilantin. It will be difficult to get therapeutic levels of Dilantin.

If you are using Midazolam/Propofol
 (or Thiopental or Pentobarbital)

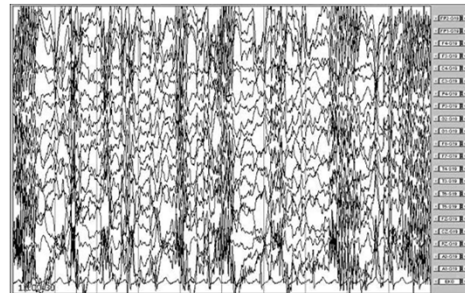
And { You are giving paralyzing agents
 or
 Status is sub-clinical

You need EEG monitoring

Status Epilepticus



Status Epilepticus



Status Epilepticus



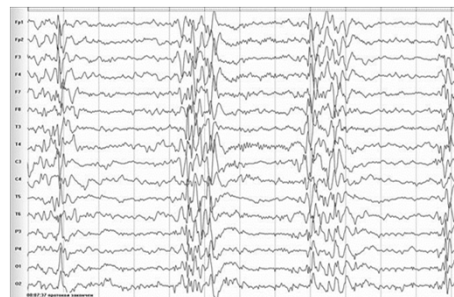
After 4mg Ativan



This is were great ICU care
"Shines"

Your goal is
"Burst Suppression" latency \approx 4 -6
seconds

Burst Suppression



Other Options

- Pentobarbital Coma
- Thiopental Coma

Seizures vs. Myoclonus

Status

- If bilateral, is synchronous
- Regular
- Not stimulus sensitive

Myoclonus

- If bilateral, not quite synchronous
- Irregularly irregular
- Is stimulus sensitive

Myoclonus

- Anoxic myoclonus:

Ativan
Clonazepam (per tube)
Diprivan/Midazolam

Special Cases

- Status from Aminophyllin - use big doses of Benzodiazapine
- Status from withdrawal of X, use X

Juvenile Myoclonic Epilepsy

- Onset 10-20 years of age
- Often with early a.m. myoclonus
- Be a hero. Use Depakote
 - Lamictal
 - Topamax
 - Keppra

Depakote

- Broad spectrum, great kinetics, bid dosage
- Tremor - ↑ frequency dosing
- Hair loss – Centrum Silver
- Appetite Stimulant
- Occasionally will elevate ammonia

Is Depakote Safe?

Best studies were 3 consecutive comprehensive reviews out of Virginia

- 1978 to 1984
- 1985 to 1986
- 1987 to 1993 – published in *Neurology, March-1977*

Depakote

- Risk if < 2 years old and on other anti-seizure medications 1:600
- Risk if between 3 and 10 years old and on other anti-seizure medications 1:8,300
- Risk if > 10 years old, not on polytherapy, not mentally retarded. No deaths in 700,000 patients.

Status epilepticus

- Refractory status epilepticus (greater than 1 hour) has a mortality of 30%
- Topamax 300-1600mg reported improved control, but will cause lethargy

Dilantin

Still a good drug & has two advantages:

1. Expense
2. Once a day dosage

Some disadvantages:

1. Hirsutism
2. Gum overgrowth
3. Zero order kinetics
4. Long term osteoporosis

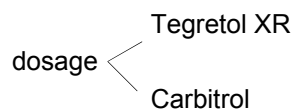
Dilantin

Recent studies suggest the elderly require lower range 5 – 10 mg/DL.

Tegretol

Still a good drug & has two advantages:

New formulations allow bid

dosage 

Excellent choice for focal seizures,
boxed warning

**KEPPRA
(Levetiracetam)**

- A “novel” anticonvulsant
- Excellent side effect profile
- Can be used with liver toxicity
- Allows much more rapid titration to effective dose than Topamax or Lamictal
- 250 b.i.d. or 500 b.i.d. titrate to 1500 b.i.d.

Questions your patients will ask...

1. Can I drive?
2. What about ETOH?
3. What about stress?
4. How long will I need to take this medication?
5. Birth defects?
6. Breast feeding?
7. Will my children inherit this?

Questions your patients probably won't ask

1. SUDEP
2. Osteoporosis
3. Role of sleep apnea/periodic limb movement disorder
4. Seizure surgery