Case Review: Seizure Detection & Management on aEEG

5 Minute Friday
8/12/16

Sonia Bonifacio, M.D.
NEURONICU
Case

Term Infant born via emergent C-section for Decel X12 minutes
Tight Nuchal Cord with absence of blood noted in cord
Meconium - light
APGAR: 2/4/4/4/5

Cord Blood Gas:
Vein: 7.22/48/42/-8
Artery: 7.12/64/43/-9

First Baby Gas: 6.76/67/106/10/-26

Resuscitation:
Lifeless, flaccid, poor color, no respiratory effort, HR>100
BMV, Intubated
Remained non-reactive, hypotonic, gasping respirations at 18 min then developed some spontaneous movements and jitteriness

Met criteria for Hypothermia – cooled passively and on transport
Arrived to LPCH at 8pm (8.5 hrs of life)
Initial aEEG Background

Questions to ask when monitoring:
1. What is the background pattern?
2. Are there areas suspicious for seizures?
   1. What is the pretest probability of seizures developing in this patient?
aEEG Background Pattern

Pro
Apply & Interpret at Bedside
Track Trends
Con
Lower Sensitivity and Specificity for Seizure Detection

Filter, rectify, smooth, compress, amplitude-integrate
15 seconds
aEEG Seizure Detection

Seizures may be detected as a sharp rise in upper and lower margins of tracing.

Correlated with raw EEG trace.

Raw EEG should show gradual build-up and then decline (evolve) in frequency and amplitude and last >10 seconds.

Status Epilepticus – Saw-Toothed Pattern
Desats and shallow breathing:
1:36
1:46
Apnea & Desat:
4:42
5:15
5:45
6:26
6:55
8:00
Apnea & Desat:
8:45
9:30
10:00
10:45
Problems with this case…

1. Seizures on aEEG/EEG not recognized during middle of night

2. EEG – loss of 2 hours of recording
   1. Improve troubleshooting – if tech does not answer page neurology

3. Multiple events documented by nursing staff and multiple practitioners notified
   1. Was the trace reviewed at the bedside?
   2. What was the interpretation?
   3. Multiple repetitive events should raise suspicion for seizure?
   4. If uncertain call neurology to have EEG reviewed?

4. Phenobarbital not ordered till 8am and administered at 8:36am
   1. Order drugs stat but pull for pyxis – do not wait for pharmacy to dispense medication
   2. Goal is to get medication administered within 20 minutes
Questions to ask when trying to determine if what you see is seizure?

What is the pre-test probability that the events are seizures?
- Apnea w/out bradycardia in a term infant is abnormal and known to be associated with electrographic seizures. In this case the pretest probability was high.

Is there only one event or are the events repetitive?
- On aEEG if there is only one suspicious area then it is ok to wait for more events or to get EEG placed ASAP. Multiple repetitive events most likely represent seizure. Must r/o artifact. Most artifacts can easily be excluded (EKG, Ventilator, patting, sucking) and they are constant and do not start and stop with some regular frequency.
aEEG/EEG Review Protocol and Management

**Review aEEG at 20 min, 40 min and at 1 hour after recording initiated**
- Review background pattern
- Look for seizures or EEG correlate of suspicious clinical activity
- Frequency of review dependent on seizures or risk of seizures
- In high risk patients – HIE with abnormal background – review every 1 hr in first 12 hours then every 2 hours for next 12-18 hours

**Video-EEG – review with neurology after 1 hour of recording**
- **If seizures are identified**
  - Treat per institutional guidelines
- Review closely after AED administered – electro-clinical dissociation, change in background
- Make a plan for future review during the highest risk period

**If uncertain – ask for help**
- Call attending
- Call neurology – give a full description; Expedite EEG placement if possible
- If suspicion is high – give either a dose of ativan or a load of phenobarbital and watch for changes on aEEG. In the setting of multiple events do not wait for EEG to confirm before initiating treatment.