Recording Strategies:
Dispelling the Myths of What Doctors Want

Iftikhar Khan, M.D.

Medical History

- History
  - Seizure symptoms/signs
    - Frequency and duration of events, age of onset, familial history of seizures, loss of consciousness, aura, affected side of body
  - Medical history
    - Significant CT/MRI findings
    - Coexisting medical conditions,
      - Kidney & liver disease, electrolytic disturbances (hypokalemia, hyponatremia)head injury, stroke, etc.
    - Gestational age, developmental delay, behavior problems
- Medications
  - List all medications that affect EEG
    - Anti epileptics
    - Sedatives (time/dosage)

Document

- Behavioral state
  - Awake/alert, drowsy, asleep, arousal
  - Sleep deprived
  - Confused
  - Coma
    - Responsive to stimuli (noise, pain),
    - Unresponsive
      - Presence or absence of corneal and gag reflexes

Activation Procedures

- Hyperventilation
  - Physiological effects and efficacy of activating epileptiform EEG discharges
    - Most important in children under age of 15
    - Generalized – Absence
    - Focal – Accentuate focal slowing
- Photic Stimulation
  - Eyelids may remain closed
  - Seizure susceptibility
  - Photosensitivity
  - When to abort
    - Spike and wave discharges outlast train of stimulus
    - Intolerance to bright lights
  - Low utility in patients over age 50
  - Utility in comatose patients

Importance of Sleep

- Drowsy
  - Not adequate to unmask epileptiform activity, may help identify focal slowing
- Asleep
  - Recording time should be determined after achieving sleep and adequate awake state; 20 minute recording suboptimal
  - Record at least five minutes following arousal
- Sleep Deprivation
  - Patient should reach Stage 2 prior to waking
  - Generalized seizure – most important
  - Focal seizure

- Seizure/spell provoking
  - Psychological stimuli/suggestion
    - Simple suggestion can be used with adequate documentation and video monitoring
      - Flickering lights; smell alcohol swab

Preventable Errors of Interpretation

- Interpretation without clinical correlation
  - Inadequate documentation during recorded event
    - Eyes open/closed, eyelids fluttering, responsiveness, twitching, jerking, vocalizations, automatisms

Medication

- Medication effects and dosage
  - Lithium
    - Spike appearing discharges
  - Tricyclic agents
    - Diffuse slowing
  - Bronchodilators
    - Aminophylline – paroxysmal high amplitude discharges
  - Benadryl
    - Generalized slowing
    - 6 Hz Spike and wave activity

Reviewing Strategy

- Bipolar
  - Less ECG artifact
  - Good for localizing focal abnormalities
  - End of chain – circumferential (hatband)
  - Disadvantages
    - Similar activity in both inputs cancels out

Montage Selection

- Bipolar
  - Longitudinal bipolar (double banana)
  - Good for localizing focal abnormalities
    - Phase reversal
  - Circumferential (hatband)
    - Localizing end-of-chain abnormality (Fp1/2, O1/2)
  - Transverse
    - Parasagital focus

- Referential
  - Good for determining true amplitude and morphology if inactive reference used
  - Localization identified by highest amplitude
  - Ipsilateral ear
    - Contaminated by temporal abnormality
  - Contralateral ear
    - Temporal region abnormality
    - Amplitude accentuated
  - CZ
    - Good reference for recording temporal lobe abnormalities
    - Contaminated by high amplitude sleep transient waves
  - Average reference
    - Combines all leads to construct inactive reference
    - Not good for generalized abnormalities

Clarifying Equivocal Waveforms

- Ask patient to count out loud to demonstrate level of arousal
  - Lack of organized background pattern (alpha)
  - Frontal Intermittent Rhythmic Delta Activity (FIRDA)
    - Normal in drowsiness, abnormal in awake state
  - Triphasic waveforms mimic generalized epileptiform discharges
    - Encephalopathic patients
    - Arousal will decrease triphasic discharges