Optimizing Patient Outcome:
Integrating EEG

Raising qEEG to a Medical Standard

Ron J. Swatzyna, Ph.D., LCSW
Board Certified in Neurofeedback, Associate Fellow
Board Certified in Biofeedback, Associate Fellow
Director of Neurotherapy
Director of Electro-Neurophysiology Research
Board of Directors: Rice University/Texas Medical Center Chapter
Sigma Xi: The Scientific Research Society

Optimizing Patient Outcome

- Having performed thousands of EEGs and qEEGs, we placed all the client data in a de-identified archive and are now researching on the findings.
- We are in the process of publishing our research (see references)
- This webinar will bring you current on our findings

Clinical Research

- Since 2005 we have done over 1800 EEGs
- Each EEG was interpreted by a board certified electroencephalographer
- Each qEEG was done by a service
Clinical Research Since 2008

- The Basic Application of Pharmaco-EEG in a Clinical Setting ISNR Conference (2008)
- 46 peer-reviewed presentations/publications on brain abnormalities presented nationally and internationally
- 2 research assistants
- 2 Rice University research interns
- NO FUNDING

IRB Approved Data Archive

- N = 735
- Ages 4 – 72
- 87 variables each plus
- 296 Likert scaled answers to questions over 42 neurodiagnostic categories

Questions Our Outcome Data Answers

- What are the common EEG findings predicting treatment failure?
- How can we transfer data with HIPAA compliance?
- What is the incidence of IED in ASD and ADHD?
- If IEDs are empirically treated, what is the outcome?
- What has the cost/benefit been of having the EEG/qEEG medically interpreted?
National Institute of Mental Health

- Dr. Thomas Insel: The DSM is an invalid instrument (2012).
- Their goal is to move away from symptom-based treatment and to instead develop evidence-based diagnosis
- Research Domain Criteria project (RDoC)

QEEGs
Last resort?

- Many who come to get qEEGs have often tried many other treatments prior including:
  - Individual and group therapy
  - Medication
  - Behavioral therapy
  - Nutrition
  - Hyperbaric oxygen

Treatment Failure?

- Why did prior treatments fail?
- Why did they have such an atypical response to medications?
- If we could use the EEG data we collect for more than just brain maps why wouldn't we?
QEEG Brain Mapping

- (qEEG) Individual brain function is compared to a database of “normal” subjects

EEGs reveal transient abnormal brain activity

- Is a recording of electrical brain activity

EEG Interpretation Service

- Commercial EEG services
- With board certified electroencephalographers licensed in each state
- Upload the EEG data and download the report.
- Note: Reporting of EEG findings by non-certified clinicians is practicing medicine without a license
Prevalence of Abnormal EEGs

- Abnormal EEGs are common especially in those who have:
  - Failed multiple medication trials
  - Failed to respond to treatment (including NFB)
  - Had a sudden change in mental status
  - Have an abnormal physical presentation
  - Whose mother’s gut instinct tell her we are missing something

EEG Abnormalities and EEG Presentation

- Encephalopathies
- Congenital abnormalities
- Cerebrovascular issues
- Epileptiform activity
Encephalopathy
Disease, Damage, or Malfunction of the Brain

- Need to identify etiology
- Most common causes identified in the past 11 years:
  - Metabolic
  - Toxic
  - Electrolytic
  - Anoxic
  - Traumatic
- Psychotropic medication needs metabolic support to work
- Treat by identifying and rectifying the cause of the problem

Metabolic/Toxic Encephalopathy

- The patient's EEG showed an extreme "low voltage slow" (LVS) pattern. LVS is highly correlated with either a toxic or metabolic issues. In essence, the brain is not getting enough energy to function cognitively.
Metabolic Encephalopathy

- Thyroid issues
- Case examples
  - Hashimoto’s thyroiditis
  - Radiation exposure

Toxic Encephalopathy

- Toxic exposure (delayed response)
  - Case examples: Insecticide
    - Ingestion of insecticide at 3 y/o
    - Enuresis started age 5 bedwetting
    - and soiling himself during the day

Toxic Encephalopathy

9 y/o Male
Metabolic Encephalopathy
24 y/o Male

Anoxic Encephalopathy

- Chronic sleep apnea
- Case example
  - Prevents normal brain aging
  - Made worse with stimulants

Anoxic Encephalopathy
22 y/o male Sleep Walker
Anoxic Encephalopathy

- The appearance of generalized encephalopathy in the most recent EEG lead me to believe that his extended history of sleep apnea may have substantially affected his brain. Hypoxia has been linked to encephalopathy.
- Three months following removal of his tonsils and adenoids brain stabilized and sleep walking was no longer an issue.

Electrolyte Imbalance

- Iron, salt, potassium
- Case example
  - Addison’s disease

Addison’s Disease

- EEG abnormalities:
  - High voltage bursts of 3 to 6 seconds
  - Diffuse slowing, 1-to 3-second bursts of slow activity
  - Paroxysmal sharp and slow wave discharges
- Neuropsychiatric symptoms are progressive
  - Cognitive impairment
  - Mental status change
  - Stroke-like-symptoms
  - Psychosis possible
Traumatic Encephalopathy

- Multiple concussions or blast injuries
- Case examples
  - Sport injuries
  - Combat injuries

Structural Defects

- Agenesis of the Corpus Coliseum
  - Case example of total agenesis
- Tumor
  - Case example

Complete Agenesis of the Corpus Coliseum

34 y/o Male  Dx: ASD
Subcortical Tumor
17 y/o Male  ODD/LD

Case Series Study
EEG/qEEG 1 November 2012

• 8 y/o male: ADHD
• CNS underarousal, Mu rhythm, EEG has transients and paroxysmal discharges
• This patient’s EEG is moderately slow for age in occipital leads bilaterally and must be considered mildly and nonspecifically abnormal on this basis. There are no focal or lateralizing features.
This patient’s EEG shows evidence of right posterior hemisphere abnormality: during the eyes-open state there was a focus of slow activity in the right occipital region; during the eyes-closed state there was alpha asymmetry with right occipital alpha activity appearing higher in voltage on the right side, and right occipital spike activity. Findings are most consistent with the presence of a subacute or chronic lesion in the right posterior hemisphere.
MRI

- Study: MR MRI Brain w/wo
- Impression:
  - 1. Normal appearance of the brain without signal abnormality or structural irregularity.
  - 2. Extensive paranasal sinus inflammatory mucosal disease with moderate-seized fluid levels seen in the maxillary sinuses.

EEG/qEEG 3
November 2014

- Dx: Sinus disease
- Tx: Antibiotics
- This patient’s EEG has improved when compared with his most recent study of 8/7/14 in that the right occipital abnormalities noted at that time are no longer seen. The present study is intermittently slow in anterior leads but otherwise approaches normal character for age.
Temporal Mild Slow and Sharp Activity

- Cardiovascular (pump) issues
  - Case example

- Cerebrovascular (vessel) issues
  - Case Example
• EEG report: This patient’s EEG shows some independent slow activity in the left and right temporal regions. Such findings may occur in asymptomatic individuals in this age group but are believed to have some association with cerebrovascular insufficiency.

• MD Recommendations: Evaluation of cardiac and carotid sufficiency is suggested along with neuroimaging to evaluate these areas.
55 y/o Female

- Sudden onset of symptoms: word finding difficulties, could no longer sing, loss of hand coordination
- MRI unremarkable
- Dx: Conversion disorder ordered neuropsychological testing
- Report Findings: Temporal sharp-slow changes on the left may be seen with early vascular changes and various forms of ischemia.

Temporal Mile Sharp & Slow Activity
55 y/o Female

MRI unremarkable
Treatment

- Femoral artery procedure
- Two stints and three coils
- Symptoms resolved over the next two years
Epileptiform Activity

- Isolated epileptiform discharges cannot be identified in a qEEG
- Absence seizures
- Temporal lobe epilepsy
- Multi foci poly-spike wave complexes

Absence Seizure Case

6 y/o Male

Treatment

- Referred to pediatric neurologist who recommended ethosuximide
- Mother refused because she did not see any symptoms
- Six months later he had his first unprovoked seizure
Temporal Lobe Epilepsy Case

• 21 y/o male with no history of mental health issues prior to 2 years ago
• Patient started experiencing syncope episodes (drop seizures)
• Forced to withdrawal from school
• Inpatient treatment at mental health facility and then hospitalized

Symptoms & Diagnosis

21 y/o Male

• Sx: Visual and auditory hallucinations, sleep onset issues, memory issues, syncope episodes
• Dx: Conversion disorder; GAD, Mood disorder, OCD, Psychosis
• Zyprexa 10mg QPM; Lexipro 20mg; Clonipin
• Past Medications tried: benzodiazepines; Depakote, Rexulti; Lamictal

Findings

• EEG: This patient’s EEG shows a focus of spike activity in the left posterior temporal region, suggesting the presence of an irritative and epileptogenic lesion in this area.
• There are transient semirhythmic sharp waves seen temporally, with spikes identified in the visual EEG analysis and with the temporal semirhythmic spikes reported commonly in temporal lobe epilepsy. The automatic spike detector failed to identify any spikes.
24 y/o Female
Abnormal EEG

- No pathology
- MRI unremarkable

Treatment & Prognosis

- Referred to a neurologist who prescribed Trileptal
- Symptoms abated
- Started neurofeedback August 2016
- Prognosis: if improvement continues, patient should be able to return to school January 2017
EEG shows sharp wave activity in the left and right occipitotemporal regions, suggesting the presence of irritative and potentially epileptogenic lesions or disturbances in these areas.

Conclusions

• Our industry sees very complicated cases
• What is our ethical responsibility?
• The costs of the report is small
• The costs if something is missed can be ...
• EEG studies can be of benefit to prescribing physicians and treating clinicians

Questions?
References


