EEG'S IN PSYCHIATRY

Eugene Allers

CASE STUDY

- 16 yr old female
- Insomnia
- Depression
- Poor school performance
- No obvious stressors
- Antidepressant failure
- SAIS-R – Non verbal IQ 30 points higher
- MRI Brain Normal
- Normal 4 hour EEG done 1 month ago

CASE STUDY

- EEG recording started 16:45
- (5 hrs and 22 minutes later)
  - Irregular, focal, phase reversal waves were noted in the Bi-Frontal lobes.
  - Irregular sharp tipped waves in the left T5-O1 area.
  - Sharp, tipped waves were noted in the temporal lobes (T6-T5)

- The record is abnormal due to an electrical disturbance in the Fronto-Temporal lobes with dominance in the left hemisphere.
- These findings are compatible with a Fronto-Temporal lobe disorder

GLYNNVIEW HOSPITAL

- Previously (n=283)
  - 9% of patients got EEG's
  - 22% of the EEG's were abnormal

- Currently (n=893)
  - 18% of patients got EEG's
  - 22% of the EEG's were abnormal

INDICATIONS FOR EEG's

Table – Indications for clinical EEGs in patients with psychiatric disorders

Nonspecific indications

- Atypical presentation (eg, unusual age of onset)
- Atypical symptoms (eg, unilateral or stereotypic hallucinations)

Isolated epileptic discharges

- Panic attacks and other dissociative symptoms
- Repetitive aggressive episodes (particularly if seemingly unmotivated)
- Medically unresponsive ADHD

Slow activity present

- Acute confusional state in the absence of medical explanation[a]
- Individuals presenting with a difficult to assess mental status[a]: differential diagnosis of dementia vs depression
- History of possibly significant brain insult (eg, head injury or stroke)

EEG, electroencephalogram. [a] Can be considered emergencies.

THE PREVALENCE OF EEG ABNORMALITIES IN PSYCHIATRIC PATIENTS

- 20% to 68% higher than in healthy controls

- Tucker GJ, Detre T, Harrow M, Glaser GH. Behavior and symptoms of psychiatric patients and the electroencephalogram. *Arch Gen Psychiatry.* 1965;12:278-286.
- Struve FA. The necessity and value of securing routine electroencephalograms in psychiatric patients: a preliminary report on the issue of referrals. *Clin Electroencephalogr.* 1976;7:115-130.
- Struve FA. EEG findings detected in routine screening of psychiatric patients: relationship to prior expectation of positive results. *Clin Electroencephalogr.* 1977;8:47-50.
- Fenton GW, Standage K. Clinical electroencephalography in a psychiatric service. *Rev Can Psychiatrie.* 1993;38:333-338.

EEG DISCHARGES WITHOUT OVERT SEIZURES

- May have behavioral consequences such as emotional lability, irritability, or emotional dysregulation that cut across broad diagnostic labels

BORDERLINE PERSONALITY DISORDER

- A number of case reports describe patients who received a diagnosis of borderline personality disorder (BPD) and who were subsequently found to have isolated epileptic discharges over one or both temporal regions

- Cowdry RW, Pickar D, Davies R. Symptoms and EEG findings in the borderline syndrome. *Int J Psychiatry Med.* 1985-1986;15:201-211.
- **8.** Snyder S, Pitts WM Jr. Electroencephalography of DSM-III borderline personality disorder. *Acta Psychiatr Scand.* 1984;69:129-134.
- **9.** Messner E. Covert complex partial seizures in psychotherapy. *Am J Orthopsychiatry.* 1986;56:323-326

BORDERLINE PERSONALITY DISORDER

- Abnormalities (mainly cortical slowing) were most frequently bilateral and of frontal, temporal, or frontotemporal distribution

BORDERLINE PERSONALITY DISORDER

1. Fear of abandonment.
2. Unstable relationships.
3. Unclear or unstable self-image.
4. Impulsive, self-destructive behaviors.
5. Self-harm.
6. Extreme emotional swings.
7. Chronic feelings of emptiness.
8. Explosive anger.
9. Feeling suspicious or out of touch with reality.

AUTISM

- Epilepsy is common in children with autistic spectrum disorders (ASD).
- A significant proportion of children with ASD have abnormal EEGs, even those who have never had a seizure.
- EEG abnormalities can range from mild slow wave abnormalities to frank epileptiform discharges (epileptiform discharges may only be detected during sleep and at times may require prolonged monitoring).

AUTISM SPECTRUM DISORDER

- A. Persistent deficits in social communication and social interaction across multiple contexts, as manifested by the following, currently or by history (examples are illustrative, not exhaustive; see text):
- B. Restricted, repetitive patterns of behavior, interests, or activities, as manifested by at least two of the following, currently or by history (examples are illustrative, not exhaustive; see text):

AUTISM SPECTRUM DISORDER

- A. Persistent deficits in social communication and social interaction across multiple contexts, as manifested by the following, currently or by history (examples are illustrative, not exhaustive; see text):
  - 1. Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions.
  - 2. Deficits in nonverbal communicative behaviors used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and nonverbal communication.
  - 3. Deficits in developing, maintaining, and understanding relationships, ranging, for example, from difficulties adjusting behavior to suit various social contexts; to difficulties in sharing imaginative play or in making friends; to absence of interest in peers. Specify current severity: Severity is based on social communication impairments and restricted, repetitive patterns of behavior (see Table 1).

AUTISM SPECTRUM DISORDER

- B. Restricted, repetitive patterns of behavior, interests, or activities, as manifested by at least two of the following, currently or by history (examples are illustrative, not exhaustive; see text):
  - 1. Stereotyped or repetitive motor movements, use of objects, or speech (e.g., simple motor stereotypes, lining up toys or flipping objects, echolalia, idiosyncratic phrases).
  - 2. Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat same food every day).
  - 3. Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interests).
  - 4. Hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of the environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).

ASD

- Rate of epileptiform EEG abnormalities is significantly higher (14%) than in children without obvious deterioration (6%). The average child who participated in this study was first evaluated neurologically 4 years after the onset of deterioration.

- Tuchman RF, Rapin I. Regression in pervasive developmental disorders: seizures and epileptiform electroencephalogram correlates. *Pediatrics.* 1997;99:560-566.

PANIC DISORDER

- The most common psychiatric disorder that must be differentiated from temporal lobe epilepsy is panic disorder.
- Aphasia accompanied seizure activity in some patients. This differentiation could be diagnostically challenging because patients with documented complex partial seizures of temporal lobe origin may have concomitant nonictal episodic emotional symptoms, including phobia, true panic attacks, and anxiety

- Young GB, Chandarana PC, Blume WT, et al. Mesial temporal lobe seizures presenting as anxiety disorders. *J Neuropsychiatry Clin Neurosci.* 1995;7:352-357.
- Signer SF. Seizure disorder or panic disorder? *Am J Psychiatry.* 1988;145:275-276.
- Spitz MC. Panic disorder in seizure patients: a diagnostic pitfall. *Epilepsia.* 1991;32:33-38

VIOLENCE AND AGGRESSION

- The prevalence of abnormal EEGs ranges widely, from 6.6% in patients with rage attacks and episodic violent behavior to 53% in patients with antisocial personality disorder.
- Monroe showed that anticonvulsants can block EEG epileptiform discharges and can lead to dramatic clinical improvement in individuals who exhibit aggressive behavior.
- Neppe provided evidence on the clinical usefulness of adding carbamazepine to the treatment of violent schizophrenia patients with repeated aggressive episodes who also exhibit temporal lobe abnormalities on the EEG but who have no history of a seizure disorder.
- When carbamazepine was added to the neuroleptic regimen of women with schizophrenia who also had EEG abnormalities.

- Blake PY, Pincus JH, Buckner C. Neurologic abnormalities in murderers. *Neurology*. 1995;45:1641-1647.
- Stafford-Clark D, Taylor FH. Clinical and electro-encephalographic studies of prisoners charged with murder. *J Neurol Neurosurg Psychiatry*. 1949;12:325-330.
- Monroe RR. Anticonvulsants in the treatment of aggression. *J Nerv Ment Dis*. 1975;160:119-126.
- Neppe VM. Carbamazepine as adjunctive treatment in nonepileptic chronic inpatients with EEG temporal lobe abnormalities. *J Clin Psychiatry*. 1983;44:326-331.
- Hakola HP, Laulumaa VA. Carbamazepine in the treatment of violent schizophrenics. *Lancet*. 1982;1:1358.
- Yassa R, Dupont B. Carbamazepine in the treatment of aggressive behavior in schizophrenic patients: a case report. *Can J Psychiatry*. 1983;28:566-568

ADHD

- 31% had abnormal routine EEGs. Of the children with abnormal EEGs, 84% had spikes or spike-wave discharges; the others had excessive background cortical slowing.

- Phillips BB, Drake ME Jr, Hietter SA, et al. Electroencephalography in childhood conduct and behavior disorders. *Clin Electroencephalogr.* 1993;24:25-30

- 7% of definite abnormalities suggestive of seizure disorder
- 19% moderately abnormal dysrhythmias not diagnostic of seizure disorder in children with ADHD.
- On the basis of their findings, they suggested these 6 indications for an ECG in a child presenting with ADHD:
  1. Personal or family history of seizures
  2. Inattentive episodes characterized by excessive daydreaming and/or periodic confused states
  3. Comorbid episodic, unprovoked temper or rage attacks
  4. Frequently recurring headaches
  5. A history of head trauma, encephalitis, or meningitis preceding the onset of ADHD
  6. Abnormalities on neurological examination

- Millichap JG. Attention deficit-hyperactivity disorder and the electroencephalogram. *Epilepsy Behav.* 2000;1:453-454

ATYPICAL BIPOLAR DISORDER / RAPID CYCLING

- Isolated epileptic discharges on an EEG.
- Epilepsy can mimic symptoms of Bipolar Disorder

- Levy AB, Drake ME, Shy KE. EEG evidence of epileptiform paroxysms in rapid cycling bipolar patients. *J Clin Psychiatry.*1988;49:232-234.

MOOD DISORDERS

- EEG does not contribute to the diagnosis of schizophrenia or bipolar disorders except that it helps the clinician rule out a neurological cause for the symptoms when a patient presents with an atypical picture (eg, unusual age of onset)

- Himmelhoch JM. Cerebral dvsrhythmia, substance abuse, and the nature of secondary affective illness. *Psychiatr Ann.* 1987;17:710-727

DEMENTIA VS PSEUDODEMENTIA

- The more abnormal the EEG is, the less likely to be pseudodementia

- Brenner RP, Reynolds CF 3rd, Ulrich RF. EEG findings in depressive pseudodementia and dementia with secondary depression. *Electroencephalogr Clin Neurophysiol.* 1989;72:298-304.

DELIRIUM

- Most often, patients with delirium have a toxic-metabolic encephalopathy.
- Diffuse slowing of the background rhythms, including alpha (8 to 13 Hz) to theta (4 to 7.5 Hz) activity. Delta (less than 3.5 Hz) activity usually does not become prominent until the patient approaches nonresponsiveness. The major exception to the above rule is seen during withdrawal from alcohol and during delirium tremens (DTs). Excessive fast activity (rather than slowing) dominates the EEG (beta activity: 13 to 30 Hz) in patients with alcohol withdrawal delirium

- Reilly EL, Glass G, Faillace LA. EEGs in an alcohol detoxification and treatment center. *Clin Electroencephalogr.* 1979;10:69-71.

Thank You