

VIDEO-EEG CASE PRESENTATIONS: YOU MAKE THE CALL

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“To study the phenomenon of disease without books is to sail an uncharted sea, while to study books without patients is to not go to sea at all.”¹

We learn something from each patient, and we learn more from patients who present us with a challenge. Case formats are an effective way for health care professionals to learn because they teach us a “bullet” of information from the experience derived from “that one patient” who presents a diagnostic or treatment dilemma. The field of epileptology is among the most robust and dynamic areas of medicine. Some seizures possess dramatic semiology to mimic psychiatric or other non-epileptic conditions. Reviewing video-EEG monitoring sessions from challenging cases include some of the most bizarre behaviors that a Neurologist will face. The unique cases will stimulate our power of deductive reasoning as we consider the different permutations of the epilepsies and epilepsy syndromes that exist.

Video-EEG monitoring is a means to obtain a definitive diagnosis in difficult cases involving seizures and spells that defy us when routine history and physical examination, neuroimaging and EEG do not. Oftentimes the clinical history alone is inadequate for arriving at the diagnosis. This stems partly from limitations in witness observation, limited ability or knowledge by an observer, patient awareness for their seizures, or a combination. There is simply no singular written text that can replace the practical knowledge that is derived from listening to patients and examining them to learn individual details that can unfold during the review of case vignettes. Additionally, even with activation procedures including sleep deprivation, hyperventilation, and intermittent photic stimulation, abnormal epileptiform discharges may be absent on standard scalp EEG recordings. An appropriate diagnosis may require objective review of the seizure behavior in concert with the event-related EEG *during* the episode to provide an accurate diagnosis. Despite video-EEG monitoring, our overreliance on “tests” does not replace the clinical acumen that has been cultivated during training and in practice. The spontaneity and unpredictability of seizures is unique within the field of Neurology and the diagnosis of spells falls squarely on the shoulders of the Neurologist. In passing, there are those with less clinical experience who may be fooled without benefitting from video-EEG monitoring. So too are those who believe anyone can perform this “test” with equal success.

In this lecture a series of cases will be presented to address commonly heard misconceptions obtained from Neurologists caring for individuals with seizures. The cases are designed to address some of the quotations that are listed below and include examples that refute statements such as;

- “Video-EEG monitoring is easy, it’s just video with EEG.”
- “It just doesn’t look like a seizure.”
- “Maybe it is a little seizure but you just can’t tell.”
- “I can always tell when they are “pseudo-”.
- “You treat the patient not the EEG.”
- “Semiology is the foundation for localization.”
- “He’s not a candidate for surgery with bilateral lesions.”

More than 100 years later, case studies in epilepsy are still relevant² and most effective when “you make the call” by being forced to commit to how you would respond in a particular clinical scenario. Video-EEG monitoring provides clinicians with an extended period of observation that permits a differential diagnosis to become definitive when the habitual events are captured. Distinguishing between behavioral events that are associated with epilepsy and those that events that are not are critical for determining the most appropriate treatment. In addition, proper classification, quantification of seizure frequency, and characterization of an electroclinical syndrome is possible. Based upon the clinical history alone, distinguishing focal seizures with dyscognitive features associated with staring may be difficult to separate from absences. Similarly for those presenting with “grand mal” seizures, even an accurate history may sometimes defy classification to identify focal or generalized epilepsy. In addition, a significant number of patients may be unaware that a seizure has occurred. Video-EEG may help identify and quantify the seizure burden over prolonged periods of time to impact

epilepsy therapy. Lastly, the impact of surgery is indisputable. The number of patients admitted for video-EEG monitoring as part of a comprehensive presurgical evaluation is nearly as common as those evaluated for a definitive diagnosis. In the latter case, one of the most important aspects of the evaluation lies in recording the seizure behavior and the ictal EEG of one's typical seizures to further clinical localization in patients with drug resistant focal epilepsy. Various recording methods exist with video-EEG including scalp and invasive EEG monitoring. A variety of sensors exists from scalp electrodes to semi-invasive electrodes (i.e. sphenoidal) to invasive electrodes (e.g. subdural, epidural, and intracortical) to record and process an EEG signal.

From the case of a patient presenting with spells to people experiencing a first seizure to patients with drug-resistant epilepsy, the diagnostic challenges that are intertwined may be unraveled by video-EEG monitoring when the standard diagnostic approach fails to be successful. From antiseizure drugs to epilepsy surgery to neuromodulation, case studies help guide our future perspective and responses the next time we encounter a "Mrs. Jones" or "Mr. Smith" who was particularly challenging of epilepsy in past experience. Increasingly, intensive care units are now using video-EEG to monitor continuous EEG in critically ill patients. As opposed to behavioral correlation with EEG in patients with epilepsy, video-EEG in patients with critical illnesses attempt to correlate EEG patterns with little to no behavioral correlates. As digital processing of brain-derived EEG signal and video quality advance through technology, improvement in patient management will continue to occur in and outside the epilepsy monitoring unit where video-EEG monitoring began. In the future, video-EEG will continue to become an essential tool in the evaluation and management for patients with neurological paroxysmal events and for patients with epilepsy.

Today, even among the most experienced practitioners, one still hears the phrase uttered which underscores the importance of the cases studies in medicine by the words, "I remember that I once had a difficult case of ..."

1. Osler W. Books and men. *Boston Med Surg J.* 1901;144:61.
2. Tatum WO, Sirven JI, Cascino GC, eds. *Epilepsy Case Studies: Pearls for patient care.* London; New York: Springer Science-Business Media. New York 2014:1-192.