Letter: Using Continuous Intracranial Electroencephalography Monitoring to Manage Epilepsy Patients During COVID-19

To the Editor:

The COVID-19 healthcare crisis and the resulting "stay-at-home" orders have created many obstacles for physicians across disciplines who are trying to maintain the standard of care. This is particularly true for epilepsy patients with uncontrolled seizures who often require frequent ambulatory visits, ancillary testing, and even inpatient monitoring. The American Epilepsy Society statement on COVID-19 advises epilepsy centers to utilize remote care options such as telephone, telehealth, and electronic health record messaging to manage their patients, a treatment model that is largely new to epilepsy care. The urgent move to a remote care model is underscored by the International League Against Epilepsy, which advised physicians to counsel patients that they could experience an increase in seizures due to decreased access to antiepileptic medications (AEDs) and increased stress during COVID-19. Indeed, viral infection has been hypothesized to be one of the important causative factors of febrile seizures,[1] though the risk of seizures due to COVID-19 and its related fevers remain debated.[2] Novel remote-care options are thus needed during a crisis like this to ensure the best care possible for epilepsy patients.

The RNS® System (NeuroPace Inc) is a direct brain-responsive neuromodulation system that is approved to treat focal medically refractory epilepsy. This device-based treatment presents a tool to reduce the frequency of disabling seizures and provides remote monitoring of intracranial electroencephalography (iEEG), of which no other epilepsy treatment or any intracranial device-based therapy is capable. The brain-responsive neuromodulation system includes a cranially implanted neurostimulator and 2 leads (depth and/or cortical strip), which are placed at the seizure focus/foci. The neurostimulator continuously monitors iEEG from the seizure focus, detects physician-identified abnormalities in the electrographic signal, and responds with a brief burst of stimulation at the seizure focus. The neurostimulator also stores seizure and baseline electrocorticographic (ECoG) records, as well as hourly and daily counts of detected epileptiform activity. In addition, the neurostimulator stores a timestamp and an ECoG record each time the patient or caretaker swipes a magnet over the neurostimulator in order to indicate an event of concern. The neurostimulator data are uploaded from home by patients to an online portal (Patient Data Management System) for ease of access by their treating clinicians. Such a novel approach to treating, tracking, and understanding patients' electrographic seizures is particularly important when access to traditional in-clinic care is restricted, such as in the COVID-19 healthcare environment.

As typical seizure triggers such as stress and abnormal sleep patterns are expected to be on the rise during COVID-19, the opportunity to use remote iEEG to inform patient counseling and behavior management is of particular value. Inaccurate seizure counts can make it difficult for clinicians to understand how to assess the efficacy of current treatments or move forward with changes in AEDs or other treatment strategies. The iEEG stored by the RNS System makes it possible to track seizure burden remotely without relying entirely on patient seizure diaries or using ambulatory EEG systems. Trends in iEEG data can be a useful metric to determine whether a patient is improving. Upward or downward trends in the epileptiform activity or in electrographic seizures may prompt the clinician to contact a patient to check how they are doing.

The RNS System magnet feature also allows clinicians to review iEEG activity at the time the patient is experiencing a particular symptom, not limited to seizures. Issa Roach et al (2020)[3] describe 5 cases in which patient magnet swipe data were used to characterize panic attacks, psychogenic epilepsy, somatic symptom disorder, and acute posticital psychosis. Prior to treatment with the RNS System, these patients would have required hospitalization for EEG monitoring in order to distinguish these neurobehavioral events from seizures. During COVID-19, when elective hospitalization is not always possible, remote spell characterization capabilities provide a distinct advantage of the RNS System.

During COVID-19, it may be necessary for clinicians to evaluate AED effectiveness remotely by patient interview. Posthoc analyses from RNS System clinical trials suggest the iEEG data can serve as a valuable adjunct to a clinical history. For example, changes in epileptiform activity or high-frequency power in the first 1 to 2 wk following the start of a new AED allows clinicians to confidently predict whether a medication will be efficacious.[4] The quantitative information from the iEEG data has already benefitted many patients in routine care, and could be of particular value when providing remote care during crises like this.

COVID-19 has forced the traditional in-person epilepsy clinic model to adapt. The American Medical Association has shown its support of remote monitoring for epilepsy patients by issuing a new Current Procedural Terminology (CPT) code (95836) specifically for the review of ambulatory ECoG data from an implanted brain neurostimulator. Moreover, this type of online practice has been demonstrated to be effective for stable epilepsy patvients.[5] The RNS System data augment remote care, as they assist clinicians in making treatment decisions supported by long-term, quantitative, ambulatory electrographic data. Evaluating seizure frequency, spell characterization, medication effectiveness, and behavior adjustments are just a few of the ways in which the RNS System can provide support to clinicians in the COVID-19 environment and beyond.

Disclosures

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