ROLE OF VIDEO-EEG MONITORING IN THE MANAGEMENT OF INTRACTABLE SEIZURES AND NON-EPILEPTIC SPELLS

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ABSTRACT

Objective: To identify the role of video-electroencephalography (VEEG) in the diagnosis of intractable epileptic and non-epileptic events. **Methods:** Two experienced neurologists independently reviewed VEEGs of consecutive patients referred to our epilepsy monitoring unit during the period 2003-2005. **Results:** There were 33 patients in all (16 males and 17 females, mean age 23 years) with a mean VEEG recording time of 21 hours. Clinically, 16 had partial and 17 had generalized seizures. A total of fifteen patients did not show any epileptiform activity during the recording. Of these, 12 epileptic patients were referred for possible pseudoseizures due to the atypical nature of their episodes. This diagnosis was confirmed via negative EEG correlations in all these patients. **Conclusion:** Video-EEG reliably identifies a very important subset of patients with suspected epilepsy who actually have non-epileptic pseudoseizures. The technique also accurately correlates partial seizures with epileptiform discharges arising from a recognizable focus.

In most developed countries, video-EEG (VEEG) performed in epilepsy monitoring units is a well-established diagnostic tool with a widely recognized purpose.[1] Major indications include either pre-surgical assessment in preparation for epilepsy surgery, diagnostic assessment of intractable seizures, and sleep disorders.[2] In particular, VEEG is considered a 'gold standard' in the diagnosis of pseudoseizures.[3] In a developing country such as Pakistan, VEEG is an emerging technology with which practicing clinicians have had limited experience. Referrals for VEEG are also quite limited due to lack of awareness about this test.

Epilepsy is a common disorder in Pakistan, as elsewhere. Population-based estimates reveal an epilepsy prevalence of 9.99 per 1,000, translating to a total burden of 1.38 million epilepsy patients in the country.[4] No comprehensive data are available regarding the numbers of intractable epilepsy patients in our population. Reports indicate that almost 240,000 to 320,000 patients have refractory epilepsy in India.[5] Extrapolated numbers of refractory epileptic patients in the Pakistani population would be approximately 34,000-45,000. These are all potential candidates for epilepsy surgery.

Among non-invasive diagnostic methods for seizures and epilepsy, continuous VEEG monitoring is cost-effective and is considered the 'gold standard' for the identification of the seizure focus and, in turn, evaluation of patients for epilepsy surgery.[2] Most VEEG laboratories perform both long-term and short-term recordings. Even short-term recording helps distinguish between movement disorders and other non-epileptic events, and can help classify different seizure types.[2,6] Children and psychiatric patients also tolerate this test very well.[7] Studies have also suggested a mandatory role for VEEG prior to any invasive epilepsy treatment, such as vagal nerve stimulation.[8]

Short-term recording is more cost-effective and is usually preferable.[9] During the first phase of evaluation, the patient requires admission in an epilepsy monitoring unit. To capture as many seizures as possible, anti-epileptic medications are tapered down. Close monitoring is necessary to avoid status epilepticus.[10] Studies have shown that the incidence of status epilepticus is usually low during such monitoring.[11]

We undertook this pilot prospective study to see the trend of epileptic patients referred to our tertiary care center for

intractable seizures who could potentially become surgical candidates or who had non-epileptic spells.

METHODS

This is a descriptive study of patients referred to the epilepsy monitoring unit at our institution during the years 2003-2005. All patients consecutively referred for VEEG during this period were included. Written informed consent was obtained from all patients. All EEG records and the video tapes were treated with strict confidentiality.

Reasons for referral included recognition of possible non-epileptic seizures (pseudoseizures), localization of seizure focus for possible epilepsy surgery, and identification of seizure type. Anti-epileptic medications were gradually tapered according to a specific protocol, with the intent of facilitating and capturing as many seizure spells as possible.

A caregiver (either a parent or spouse) and a technologist were always present with the patient. The caregiver remained inside the patient's room while the technologist monitored the patient via closed-circuit television. Data were collected on a Nihon Kohden 'Neurofax' machine. This is usually a prolonged recording lasting at least 24 hours. The standard protocol was to record at least 4 or 5 typical events, to be analyzed later. All data were recorded and saved on video tapes for analysis and review.

VEEG allows simultaneous recording of the EEG and manifestations of epileptic seizures which are recorded on video recorder or disc. The EEG activity and the video information are synchronized via computer. Extra electrodes for electromyography (EMG), electro-oculography (EOG) and electrocardiography (ECG) are also placed to distinguish any simultaneous artifacts that may cause difficulty in interpretation. Electrodes were placed using the standard 10-20 international system of electrode placement. After bio-calibration, a routine EEG was performed. Photic stimulation and hyperventilation were used as activating procedures. Long wires were used so that patients could be ambulatory. These wires were securely tied.

A logbook was placed inside the room. The patient's caregiver and the technologist logged all episodes. The precise start time and duration of the event were also documented. Caregivers were also told to document whether these were typical of the patient, and whether all kinds of spells had been captured. During and after the recording, two neurologists with experience in VEEG monitoring reviewed the events and the interictal EEG.

RESULTS

Of a total 33 patients, 52% (n = 17) were females and 48% (n = 16) were males. Mean age was 23 (range 1-60) years. Mean age of onset for seizures was 18 years. Mean duration between seizure onset and VEEG testing was 5 years.

Seventy nine percent (n = 26) patients had daily seizures. Thirty nine percent (n = 13) had been on polypharmacy with poor seizure control. Clinically, 52% (n = 17) patients had generalized and 48% (n = 16) had partial seizures.

Mean duration of VEEG recording was 21 hours (minimum 1 hour, maximum 55 hours). During recording, 1-6 clinical seizures were noted in 73% (n = 24). In 37% (n = 7) of these cases, there epileptiform correlates on the EEG, while 63% (n = 17) showed no epileptiform discharges concurrent with clinical seizure activity.

The commonest indications for VEEG referral were (i) to rule out pseudoseizures (36%, n = 12) and (ii) to localize the epileptic focus for possible epilepsy surgery (33%, n = 11). In the former group, pseudoseizures were confirmed in all cases. In the latter, 71% (n = 5) revealed a temporal lobe focus.

Three patients referred for localization of their focus turned out to have primary generalized seizures. The remaining 31% (n = 10) were referred for classification of seizure type. Of these, five patients were diagnosed with epilepsy while another 5 had normal recordings.

DISCUSSION

This is a pilot study conducted to evaluate the importance of VEEG in epileptic patients referred to our tertiary care facility. In an epileptic patient with intractable seizures, VEEG monitoring may help in two ways: (a) by excluding any pseudoseizures and (b) to identify potential surgical candidates, especially those who have focal seizure onset.[2]

Our results verify the importance of VEEG monitoring in patients with epilepsy. This study not only confirms the importance of VEEG in the localization of seizure focus but also demonstrates how to identify a very important subgroup, namely patients with suspected epilepsy who actually have pseudoseizures.

Patients with pseudoseizures are a challenging clinical conundrum. They are very difficult to diagnose and treat, and every attack leads to an increase or change in their anti-epileptic medications.[12-14] This study highlights the

importance of VEEG in patients with suspected epilepsy whose seizures are not being controlled despite good levels of antiepileptic medications.

In keeping with published Western figures, our data also suggest that higher numbers of patients referred for VEEG had partial seizures. These are potential candidates for epilepsy surgery, which is now the standard of care for managing and treating intractable seizures.

The cost of anti-epileptic medications keeps rising and newer agents, although very effective, demand more expenditure, with higher costs of care, even in developing countries.[15] Overall, the cost-benefit ratio of VEEG may be in favor of the patient with intractable seizures. Further studies are needed to assess the cost-effectiveness of VEEG in our population.

Clinically refractory seizures can be a challenging management issue. On clinical grounds alone, with only seizure semiology as a guide, it is sometimes a daunting task to make any final decisions about treatment. Video-EEG can identify a very important subset of patients with seizures who have non-epileptic pseudoseizures, thus helping in the further management of these spells.

VEEG technology, therefore, not only helps in the diagnosis of intractable seizures and classification of seizure subtype, but it also immensely helps the future management of these patients. As most of these patients suffer from partial seizures, it can also be one of the first and most important steps in planning for epilepsy surgery.

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