The Value of Prolonged Electroencephalographic and Video Monitoring in Diagnosis of Seizure Disorders

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ABSTRACT: Prolonged electroencephalographic and video monitoring of ictal events is useful in aiding the diagnosis of complicated seizure disorders. Forty eight patients admitted to a neurology service were assessed with this technique. Twenty five (54%) had their diagnoses changed, six (14%) had their diagnoses confirmed and the remaining patients had inconclusive studies. Therapy is modified by the results and in addition both patient and staff education is enhanced through the use of this equipment.

METHODS

Patients

A total of 48 patients were admitted to the neurology service at Kingston General Hospital for study. Of these patients, 28 (58%) were female and 20 (42%) male. Their ages ranged from 13 to 57 years with a mean age of 30 years. The pre-assessment diagnoses are outlined in Table 1. The most common diagnosis was partial complex seizures (75%) with more females (48%) than males (27%).
The video record was only available while the patient was in the monitoring room. Attempts were made to classify the ictus according to the International Classification of Epileptic Seizures as outlined by Dreifuss.2 Both clinical and EEG criteria were applied. In order to differentiate seizures of psychogenic origin, the criteria set forth by Desai, Porter and Penry were used. The major criteria included features such as bizarre and varied behaviour as opposed to stereotyped actions, EEG tracings that were normal or unchanged during the ictus, no postictal slowing of the EEG record and no relationship of frequency of symptoms to the patient’s medication regime. The records were interpreted conservatively, as it is recognized that clinical seizures may occur in the absence of scalp EEG changes.2 At least one typical clinical event coupled with reliable EEG changes, or more than one typical clinical event with no EEG changes were required to make a diagnosis. If these criteria were not met, then the recording was classified as inconclusive. In addition, previous hardcopy EEG recordings were reviewed. One patient also had supplementary out-patient ambulatory four channel cassette recording (Oxford Medilog) on two occasions. Recording was usually for a full four day period. If it was felt that sufficient information had been gathered earlier, then the recording was stopped. In one patient, two four day periods were necessary.

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definite epileptic seizures. Some patients were observed in hospital for a period after medication was stopped. Some were subsequently referred for psychiatric evaluation. Selected patients were shown portions of the video recordings of their episodes.

Five patients had a prior diagnosis of epilepsy but had recently developed ictal events of a different character than those for which they had originally been diagnosed. We were able to demonstrate the presence of pseudoseizures in three of these patients. The other two had inconclusive studies.

The number of days of recording necessary to achieve a satisfactory diagnosis is variable. Approximately 40% of patients were diagnosed with less than four days recording (one - 4%, two - 13%, three - 20%). The remainder required a full four day period, with one patient requiring two recording periods.

Ambulatory recordings were made using a four channel cassette recorder in one patient. This record was used in follow up to determine how successful therapy had been. The amount of spike and wave activity was quantitated over a twenty four hour period and a reduction was observed with therapy.

**DISCUSSION**

The use of prolonged EEG and video monitoring equipment was of value in our centre in clarifying diagnoses and modifying treatment in a majority of the patients referred to us. These patients had undergone considerable prior investigation including multiple EEG recordings, and in hospital observation, without a satisfactory diagnosis being reached. We were able to make a firm diagnosis in 54% of the patients examined. In some this meant that complicated medication regimes could be eliminated.

It is interesting to compare our data to those of other centres. Quesney, Gloor and Andermann report that thirty of fifty patients monitored had partial complex seizures, the majority with lateralised EEG findings. These patients had all been selected as candidates for seizure surgery, and hence exhibit a degree of pre-selection bias. Stalberg made a satisfactory diagnosis on 65% of 185 recordings. Binnie et al recorded up to four days. The shorter recording time is certainly less expensive and recordings may be done on an outpatient basis. The longer recording period allows one to observe diurnal variations and gives the patient more time to become accustomed to the environment, thus more closely simulating natural conditions. It also allows controlled tapering of anticonvulsant medications and supervision of sleep deprivation.

There are a few caveats to consider with this technique. The patient must be cooperative; lack of co-operation may be a limiting factor in obtaining good quality recordings. The transmitter range is limited especially if there are obstructions in the recording area. The! situation can be improved by experimenting with the placement of the receiving antenna. Interference from other electrical equipment did not appear to be a problem. When lighting conditions in the room change, the nursing staff must remember to adjust the camera or significant portions of the video tape will be unusable.

The four channel ambulatory cassette recorder was used in follow up of one patient who had true absence seizures. A number of problems became apparent that would preclude using this device as the initial investigating instrument. Unless the patient is very reliable in keeping a log, it is difficult to make good clinical and electrographic correlations. In addition, with only three channels of EEG it is difficult to detect artefact easily. At times the activity from eye movements would resemble spike and wave discharges. The video record helps to eliminate some of these problems with artefact. This device did prove useful in quantitating the effectiveness of therapy by allowing measurement of the amount of spike and wave activity in a 24 hour period.

In summary the technique of EEG and video monitoring has proven in our hands to be an effective diagnostic technique in the assessment of epilepsy. It has also proven to be a valuable staff and patient educational aid. The high number of inconclusive recordings may be reduced by repeated and longer recording times in selected patients. In addition the more uniform application of activation procedures, in particular discontinuing anticonvulsant medications may be of benefit. This technique was first utilised by centres evaluating patients for epilepsy surgery. Our data suggests that it need not be limited to this application.

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REFERENCES