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Paper by Invitation

Imaging Idiopathic Generalized Epilepsy
John S. Duncan

ABSTRACT

It has been traditionally held that there is no radiological abnormality in patients with idiopathic generalized epilepsy (IGE). Sophisticated image processing and quantitative magnetic resonance imaging (MRI) studies suggest that, in some cases, there may be a subtle structural abnormality. Magnetic resonance spectroscopy indicates neuronal dysfunction with differing patterns of abnormality in the IGE sub-syndromes, and high levels of glutamate and glutamine have been suggested in the frontal lobes, and low GABA levels in the occipital lobe. Studies reflecting cerebral blood flow at the time of absences have given complex results. The principal consensus is of an increase in the thalamus and broad decreases in the neocortex, reflecting a suppression of neuronal activity, but with the possibility of some increases, that could perhaps reflect focal areas of neuronal activation.

PET ligand studies with an opioid tracer have implied neocortical release of endogenous opioids at the time of serial absences. In combination with high time-resolution neurophysiological methods, static and dynamic PET studies with specific ligands have the potential to elucidate the functional anatomy and neurochemical circuits that underlie IGE.

Emergent Electroencephalogram in the Intensive Care Unit: Indications and Diagnostic Yield
Panayiotis N. Varelas, Lotfi Hacein-Bey, Tammy Hether, Brenda Terranova and Marianna V. Spanaki

ABSTRACT

Our aim was to study the frequency and reasons an emergent electroencephalogram (EmEEG) is ordered in the ICUs compared to the hospital ward, examine its usefulness and find predictive variables for its results.

We retrospectively identified all electroencephalograms ordered between December 1997 and March 2002 and performed within 1 hour. The tests ordered from four ICUs were compared with those ordered from the Ward beds, and predictive models were developed for the results based on clinical variables. We also compared the EmEEGs ordered by the Neuro-ICU to those from the other Units.

The ICUs ordered 129 (49.4%) of all EmEEGs during the study period. The NICU ordered 32 tests. The most frequent reason for obtaining the test was to rule out status epilepticus (68.2%). The NICU ordered more frequently the test to exclude non-convulsive status than the other ICUs. Compared to non-ICU, ICU patients with head trauma or post cardiopulmonary arrest had more tests and patients with stroke fewer. Convulsive status epilepticus and generalized slowing were found more frequently in the ICUs, and normal EEG, interictal epileptiform activity or focal non-epileptic slowing were more frequent in the non-ICU cases. In at least 12.4% of ICU patients, the test was expected to lead to an anti-epileptic management change. Cardiopulmonary arrest and age were predictive of any epileptic activity on the EEG in ICU patients.

In conclusion, in our institution EmEEG is ordered by the ICUs in two thirds of the cases to exclude status epilepticus. Although status epilepticus is confirmed more frequently in the ICUs than on the Ward, the most frequent finding remains generalized slowing, which is found in half of the ICU-ordered EmEEGs. A conservative estimation is that EmEEG will lead to medication change in at least 1 out of 8 ICU patients. Cardiopulmonary arrest is predictive of epileptic activity and a prolonged EmEEG may also increase the yield.

EEG in Seizure Prognosis: Association of Slow Wave Activity and Other Factors in Patients with Apparent Misleading Epileptiform Findings

John R. Hughes and John J. Fino

ABSTRACT

Our previous study showed that patients with many spikes in their EEGs generally have uncontrolled seizures and those with no or rare spikes have controlled attacks. However, exceptions do exist, and this study was designed to determine what other aspects in the EEG could lead to the proper prognosis with these exceptions, rather than to an incorrect one. Two groups were assembled: 150 patients with 674 EEGs with controlled seizures and 150 patients with 804 EEGs with uncontrolled attacks. Our data showed that the presence or absence of a slow wave abnormality usually led to a proper prognosis in these exceptional cases. The absence of any slow wave abnormality, but with many spikes was usually associated with controlled attacks and the presence of slowing, especially with delta slow waves, but without spikes, was more often seen in patients with uncontrolled attacks. The change in the number of spikes over time also led to a more accurate prognosis.

Event-Related Potentials in Young and Elderly

Adults During a Visual Spatial Working Memory Task

Verner Knott, Anne Millar, Louise Dulude, Lisa Bradford,

Fahad Alwahabi, Tim Lau, Catherine Shea and Andrew Wiens

ABSTRACT

The P300 event-related brain potential (ERP) was examined in 14 young (20-29 years of age) and 16 elderly (60-82 years of age) subjects during the performance of a visuospatial memory task requiring recognition of locations. Elderly and young adults exhibited similar recognition accuracy, but recognition reaction times were significantly slower in the elderly. Midline P300 amplitudes recorded in response to visuospatial probe stimuli were significantly attenuated in the elderly, and, depending on the nature of the probe, P300 latency-derived indices indicated that both cognitive and motoric slowness characterized visuospatial recognition in the aged. The results, discussed in relation to neural mechanisms supporting working memory function, suggest that alterations in attention and processing speed may play a role in visual-spatial working memory deficits associated with normal and pathological aging.

Auditory Evoked Responses in a Comparison Between Schizophrenia Patients With and Without Premorbid History of Drug Abuse: Report of Pilot Results

Nash N. Boutros, Oleg Korzyukov, Glen Oliwa, Frederick Struve and Ben H. Jansen

ABSTRACT

Evidence for a role for drugs of abuse in the development of chronic psychotic syndromes is scattered throughout 40 years of literature. Electrophysiological studies examining groups believed to have chronic drug-induced psychotic symptoms yielded interesting findings. To our knowledge, no studies directly compared schizophrenia patients whose drug use preceded and those whose drug use followed the onset of psychotic symptoms.

Twenty-six schizophrenia patients and 10 healthy control subjects were recruited for the study. Based on the SCID interview, schizophrenia subjects were classified into a Psychosis First (Psy 1st) group (N=11), Drugs First (Drugs 1st; N=8), and No Drug Use (No Drugs; N=7). Schizophrenia subjects were administered the Positive and Negative Symptoms Scale (PANSS). The P300 evoked response and sensory gating were measured for all subjects. Despite the small sample sizes significant differences were found between the groups. Most significantly, the P300 amplitude was smallest in the Drugs 1st as compared to the No Drugs groups, while sensory gating deficit was worst in the Psy 1st group. The data suggest that significant clinical and electrophysiological differences between these groups can be identified. Further research to better define these differences seems warranted.

The Usefulness of Quantitative EEG (QEEG)
and Neurotherapy in the Assessment and
Treatment of Post-Concussion Syndrome
Jacques Duff

ABSTRACT

Mild traumatic brain injury (TBI) is associated with damage to frontal, temporal and parietal lobes. Post-concussion syndrome has been used to describe a range of residual symptoms that persist 12 months or more after the injury, often despite a lack of evidence of brain abnormalities on MRI and CT scans. The core deficits of post-concussion syndrome are similar to those of ADHD and mood disorders, and sufferers often report memory, socialization problems and frequent headaches. While cognitive rehabilitation and psychological support are widely used, neither has been shown to be effective in redressing the core deficits of post-concussion syndrome. On the other hand, quantitative EEG has been shown to be highly sensitive (96%) in identifying post-concussion syndrome, and neurotherapy has been shown in a number of studies to be effective in significantly improving or redressing the symptoms of post-concussion syndrome, as well as improving similar symptoms in non-TBI patients.