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Luca PC Luca B.

EEG Monitoring in the Intensive Care Unit

Peter W. Kaplan
ABSTRACT.

Rebecca Tran

1 EEG recording in the intensive care setting presents a number of technical challenges. It is essential to differentiate artifact from pathophysiologic EEG changes that would suggest encephalopathy, epileptiform activity, or seizures. There are particular patterns typical of deepening encephalopathy, as well as, coma patterns that have diagnostic and prognostic significance (e.g., spindle coma, alpha coma, burst suppression activity, and triphasic waves). Epileptiform patterns, including periodic lateralized epileptiform discharges (PLEDs), bilateral independent periodic lateralized epileptiform discharges (BIPLEDs), and generalized periodic epileptiform discharges (GPEDs), present particular challenges as there is a gray-zone between interictal patterns and the evolving (usually faster) patterns of nonconvulsive seizures. Accurate use of EEG in the intensive care unit requires optimal EEG technical expertise in performing the study, and appropriate interpretation by a trained electrophysiologist.

EEG Artifacts in the Intensive Care Unit Setting

Diane M. White & C. Anne Van Cott
ABSTRACT.

Valerie Auble

2 Obtaining a quality EEG in the intensive care unit (ICU) is a very rewarding experience for the EEG technologist. "Quality" is defined as a measure of excellence or state of being free from defects. It takes more than knowing how to obtain a quality record; it takes hands-on experience and time. Electroencephalography is a valuable neurodiagnostic tool in critically ill patients. However, the ICU is a challenging environment to obtain a high quality EEG tracing because artifacts are exceedingly common. Dealing with artifact effectively is an essential function of the EEG technologist. The goal of this paper is to review both physiological and nonphysiological artifacts commonly encountered in an ICU setting. How to recognize, troubleshoot, and prove that an EEG pattern is an artifact will be reviewed for the novice EEG technologist.

Somatosensory Evoked Potentials in Aphasic Patients

Ruth Dickstein, Ruth Zaslansky, Nir Abulaffio & Thomas Pillar
Abstract

Dirana Olanzi

3 The purpose of this study was to employ evoked potentials to evaluate the function of the somatosensory system in a group of right hemiplegic aphasic patients in whom conventional physical examination was inapplicable. Bilateral somatosensory evoked potentials (SEPs) in response to stimulation of the median nerve were recorded in 20 patients, and unilateral recordings were performed with 20 healthy, aged, matched controls. The major abnormality, present in 13 patients, was absence or reduction of the amplitude of the cortical components N19 and P22 in the lesioned side of the brain. Consequently, the only significant difference between the lesioned versus nonlesioned brain side in patients, and between patients and control subjects was in the amplitude of the cortical components.

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Electroencephalographic assessment of patients with epileptic seizures

Dimitrios I Tsiptsios¹, Robin S Howard, Michail A Koutroumanidis

Abstract

Rudine Balle

4 This article reviews the role of EEG in the diagnosis and management of patients with epilepsies. We review the morphologic and behavioral characteristics of the interictal and ictal EEG markers of the different types of epilepsy that should guide recording strategies to augment its diagnostic yield, and we attempt to delineate those particular features that may be relevant to the main epilepsy syndromes. Particular emphasis is placed on the activation methods, including hyperventilation, sleep deprivation and sleep, and specific triggers, as well as how these may differ between idiopathic and cryptogenic/symptomatic generalized and focal epilepsies, commenting on possible diagnostic pitfalls and areas of uncertainty. We also consider the indications for long-term recordings (video--telemetry and ambulatory) and emphasize the diagnostic value of polygraphic recordings.

Electroencephalography in Pediatric Epilepsy

Jaya Shankar Kaushik¹, Rajni Farmania²

JP

Abstract

5 Surface electroencephalography (EEG) is a useful electrophysiological investigation for evaluating a paroxysmal event in children. It measures the electro potential difference between two points on the scalp. It is a non-invasive tool that analyzes neuronal maturation and abnormal cortical excitability. EEG helps in differentiating epileptic from non-epileptic clinical event and focal seizures from generalized seizure. This review is to discuss the rational use of interictal scalp EEG in diagnosis of epilepsy and different types of epilepsy syndromes in children. It further highlights its role in febrile seizure, first unprovoked seizure, status epilepticus and unexplained coma.

The role of EEG in patients with suspected epilepsy

Selim R Benbadis¹, Sándor Beniczky², Edward Bertram³, Stephanie MacIver¹, Solomon L Moshé⁴

Selim R. Benbadis

Abstract

6 Despite the advances in imaging, EEG remains a critical test for the diagnosis of epilepsy. Not only can it confirm the diagnosis, but it can also clarify the type of epilepsy. There are many different types of EEG recordings depending on duration, the presence of video. Interictal epileptiform abnormalities are very specific to epilepsy, but they can be over-interpreted by inexperienced readers. In addition to diagnosis of epilepsy, EEG also has a role in the decision to discontinue treatment in seizure-free patients, and in assessing critically ill patients for possible status epilepticus and encephalopathies. EEG reports should be relatively standardized and clear to the clinician who requested the EEG.

Am PC. Selim

A comparison of continuous video-EEG monitoring and 30-minute EEG in an ICU

Omar I Khan¹, Christina J Azevedo², Alendia L Hartshorn³, Justin T Montanye

7 This study indicates that if continuous video-EEG is not available, a 30-minute EEG in the ICU has a substantial diagnostic yield and will lead to the detection of the majority of epileptiform abnormalities. In a small percentage of patients, continuous video-EEG will lead to the detection of additional epileptiform abnormalities. In a sub-population, with a history of seizures prior to the initiation of EEG recording, the benefits of continuous video-EEG in monitoring seizure activity and influencing treatment may be greater.

Which EEG patterns in coma are nonconvulsive status epilepticus?

Eugen Trink¹, Markus Leitinger²

Abstract

8 Nonconvulsive status epilepticus (NCSE) is common in patients with coma with a prevalence between 5% and 48%. Patients in deep coma may exhibit epileptiform EEG patterns, such as generalized periodic spikes, and there is an ongoing debate about the relationship of these patterns and NCSE. The purposes of this review are (i) to discuss the various EEG patterns found in coma, its fluctuations, and transitions and (ii) to propose modified criteria for NCSE in coma. Classical coma patterns such as diffuse polymorphic delta activity, spindle coma, alpha/theta coma, low output voltage, or burst suppression do not reflect NCSE. Any ictal patterns with a typical spatiotemporal evolution or epileptiform discharges faster than 2.5 Hz in a comatose patient reflect nonconvulsive seizures or NCSE and should be treated.

The Role of Quantitative EEG in the Diagnosis of Neuropsychiatric Disorders

Livia Livint Popa^{1,2}, Hanna Dragos^{1,2}, Cristina Pantelemon^{1,2}, Olivia Verisezan Rosu^{1,2}, Stefan Strilciuc^{1,2}

Abstract

9 Quantitative electroencephalography (QEEG) is a modern type of electroencephalography (EEG) analysis that involves recording digital EEG signals which are processed, transformed, and analyzed using complex mathematical algorithms. QEEG has brought new techniques of EEG signals feature extraction: analysis of specific frequency band and signal complexity, analysis of connectivity, and network analysis. The clinical application of QEEG is extensive, including neuropsychiatric disorders, epilepsy, stroke, dementia, traumatic brain injury, mental health disorders, and many others. In this review, we talk through existing evidence on the practical applications of this clinical tool. We conclude that to date, the role of QEEG is not necessarily to pinpoint an immediate diagnosis but to provide additional insight in conjunction with other diagnostic evaluations in order to objective information necessary for obtaining a precise diagnosis, correct disease severity assessment, and specific treatment response evaluation.

Quantitative EEG parameters correlate with the progression of human prion diseases

Edit Franko¹, Tim Wehner², Olivier Joly³, Jessica Lowe⁴, Marie-Claire Porter⁴, Joanna Kenny⁴, Andrew Thompson⁴, Peter Rudge¹, John Collinge¹, Simon Mead¹

Abstract

10 **Background:** Prion diseases are universally fatal and often rapidly progressive neurodegenerative diseases. EEG has long been used in the diagnosis of sporadic Creutzfeldt-Jakob disease; however, the characteristic waveforms do not occur in all types of prion diseases. Here, we re-evaluate the utility of EEG by focusing on the development of biomarkers. We test whether abnormal quantitative EEG parameters can be used to measure disease progression in prion diseases or predict disease onset in healthy individuals at risk of disease

Guillain-Barré Syndrome Associated with SARS-CoV-2 Infection in a Pediatric Patient

Carlos Henrique Michiles Frank¹, Taynná Vernalha Rocha Almeida², Elyana Almeida Marques³

Abstract

11 We report the case of a 15-year-old male patient presenting frontal headaches with retro-orbital pain accompanied by fever evolving to weakness and pain of the lower limbs, which ascended to upper limbs. A COVID-19 test was positive for SARS-CoV-2. The blood tests, cerebral spinal fluid (CSF) analysis and CSF aerobic culture revealed no abnormalities. PCR testing of the CSF was negative for the most prevalent etiologies as well as for SARS-CoV-2. Electroneurography study was compatible with the acute motor axonal neuropathy variant of Guillain-Barré syndrome. No cases involving young patients have been presented to date. Therefore, this is the first reported pediatric case of SARS-CoV-2 infection associated with GBS. Evidence reveals that SARS-CoV-2 infection is not limited to the respiratory tract. Neurotropism could explain this important neurologic manifestation of COVID-19 in children.

Nonconvulsive status epilepticus and coma

Gerhard Bauer¹, Eugen Trink¹

Abstract

12 Nonconvulsive status epilepticus (NCSE) in a comatose patient cannot be diagnosed without electroencephalography (EEG). In many advanced coma stages, the EEG exhibits continuous or periodic EEG abnormalities, but their causal role in coma remains unclear in many cases. To date there is no consensus on whether to treat NCSE in a comatose patient in order to improve the outcome or to retract from treatment, as these EEG patterns might reflect the end stages of a dying brain. On the basis of EEG, NCSE in comatose patients may be classified as generalized or lateralized.

A P.L. Dem

Diagnosis Accuracy of Carpal Tunnel Syndrome in Diabetic Neuropathy

Nicu Cătălin Drăghici^{1, 2, 3}, Maria Magdalena Tămaş⁴, Daniel Corneliu Leucuţa⁵,

Abstract

Elisaveta Di Giorgio

13 **Background and objectives:** Carpal tunnel syndrome (CTS) is a common pathology, but sometimes the diagnosis is delayed in patients with diabetic neuropathy (DN). The aim of the study is twofold: first, to compare the accuracy of ultrasound (US) with that of electroneurography (ENG) in the diagnosis of CTS associated with DN, using the clinical diagnosis as a reference standard, and second, to investigate the correlation between morphological US parameters and electrodiagnosis (EDX) measurements in patients with CTS and DN. **Conclusions:** Both examinations can be used with confidence in the diagnosis of CTS overlapping with DN, but the EDX examination seems to be more accurate. Furthermore, we found a positive correlation between the US and EDX parameters.

Blink reflex in progressive myoclonic epilepsies

Tülin Coşkun¹, Meral Kiziltan¹, Ayşegül Gündüz², Şakir Delil¹, Naz Yeni¹, Çiğdem Özkara¹

Abstract

Alexandra Coşkun

14 **Purpose:** Progressive myoclonic epilepsies (PME) include a heterogeneous group of disorders. The brainstem is involved in these disorders, as demonstrated by neuroimaging and autopsy studies. The blink reflex (BR) is characteristically elicited after supraorbital electrical stimulation. The BR has two components, an ipsilateral R1 and bilateral R2 (R2 and R2c). The central generator of the BR is the brainstem. In this study, we aimed to investigate the functional status of the brainstem using the BR in PME cases with different etiological factors.

Multiple sclerosis - etiology and diagnostic potential

Joanna Kamińska¹, Olga M Koper¹, Kinga Piechal², Halina Kemona¹

Abstract

Anna Kamińska

15 Multiple sclerosis (MS) is a chronic inflammatory and demyelinating disease of autoimmune originate. The main agents responsible for the MS development include exogenous, environmental, and genetic factors. MS is characterized by multifocal and temporally scattered central nervous system (CNS) damage which lead to the axonal damage. Depending on the severity of signs and symptoms MS can be described as benign MS or malignant MS. MS diagnosis is based on McDonald's diagnostic criteria, which link clinical manifestation with characteristic lesions demonstrated by magnetic resonance imaging (MRI), cerebrospinal fluid (CSF) analysis, and visual evoked potentials. It may result from fact that MS has diverse clinical course and there is a lack of single test, which would be of appropriate diagnostic sensitivity and specificity for quick and accurate diagnosis.

Dr. P.L. Rem