NEUROMUSCULAR DISEASE AND EMG

P.101

A-waves on electrodiagnostic studies in axonal and demyelinating cases of Guillain-Barré Syndrome (GBS)

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Background: A-waves are lesser-known late responses of debated clinical significance, seen in routine motor nerve conduction studies (NCS). They are proposed to be a sensitive marker of demyelination and an early finding in acute demyelinating polyradiculoneuropathy (AIDP). We hypothesized that the presence and distribution of A-waves are discriminative markers in differentiating AIDP from axonal variants of Guillain-Barré Syndrome (GBS). Methods: We identified patients diagnosed with demyelinating and axonal forms of GBS at the Montreal Neurological Institute between 2016 and 2021. Clinical and electrophysiological data including raw NCS responses were retrospectively reviewed for 28 AIDP and 9 axonal GBS cases. Results: 20 of 28 AIDP cases had at least one A-wave in non-tibial nerves compared to 2 of 9 axonal cases. Among patients with NCS available within 2 weeks of symptom onset, 13 of 14 AIDP cases had non-tibial A-waves, compared to 0 of 6 axonal cases. Eight of 14 AIDP cases had one or more nerves with multiple A-waves within 2 weeks, compared to 0 of 6 axonal cases. Conclusions: In patients with GBS, the presence of A-waves in non-tibial nerves and of nerves with multiple A-waves are early indicators of the demyelinating variant. Early identification of GBS subtype is valuable for prognostication.

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Role of interdigital sensory nerve conduction study as a noninvasive approach for early diagnosis of diabetic peripheral neuropathy

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Background: Diabetes mellitus is a common cause of polyneuropathy. Despite numerous diagnostic tools such as routine electrophysiologic procedures, its early detection is challenging. This study compares a distal electrodiagnostic technique, with conventional approaches to investigate its role in confirming early polyneuropathy. Methods: Thirty-one symptomatic diabetic outpatients and 23 asymptomatic nondiabetic subjects were included in our study. We performed nerve conduction studies on the dorsal sural, medial plantar, and digital branches of the interdigital nerves to toes I, II, and III (as a new antidromic technique). All techniques were applied with the surface stimulator and pick-up electrodes. Results: Only 9 (29%) of patients had impaired routine NCSs. Interestingly, the results of interdigital nerve studies were abnormal in 17 out of 22 patients with normal routine NCSs. Also, 11 and 13 subjects had impaired medial plantar and dorsal sural nerves conduction studies, respectively. According to this method, the prevalence of detectable diabetic neuropathy increased from 46% to 83%. Conclusions: The digital sensory branches can be easily evaluated with

the new antidromic SNAP technique for the early diagnosis of diabetic polyneuropathy, especially in presymptomatic and subclinical neuropathies. This method is simple, non-invasive, sensitive, and reproducible. There is no need for needle electrodes or averaging techniques.

OTHER ADULT NEUROLOGY

P.104

Beyond the hippocampus and the SVZ: adult neurogenesis throughout the brain

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Background: Adult neurogenesis occurs in the hippocampus and the subventricular zone. Recent evidence suggests that neurogenesis may also extend to other brain regions (hypothalamus, striatum, substantia nigra, cortex, and amygdala). Harnessing this intrinsic neurogenic potential may present a novel alternative for the replenishment of neurons lost in neurologic conditions. Methods: This descriptive review summarizes evidence supporting the classic and novel neurogenic zones present within the mammalian brain, discusses the functional significance of these new neurons, and the potential clinical applications of promoting intrinsic neurogenesis. Results: Some studies suggest new neurons originate from endogenous stem cell pools located within novel neurogenic regions while others show the migration from the subventricular zone to these regions. Regardless, adult neurogenesis is impacted by neurologic processes such as ischemia and neurodegenerative diseases and can be modulated by factors including neurotrophins, pharmacologic interventions, environmental exposures, exercise, and stem cell therapy. Conclusions: The discovery of functionally significant neurogenesis in adult brain regions has implications not only with regards to the function of these regions, but also for neuropathological conditions that affect them. Pharmacologic and stem cell-based strategies capable of promoting neurogenesis may have therapeutic potential following stroke or in the context of various neurodegenerative disorders.

MULTI-SOCIETY DEMENTIA AND COGNITIVE DISORDERS

P.105

Using mobile electroencephalography for rapid detection of mild cognitive impairment

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Background: Mild cognitive impairment (MCI) is a concern for our aging population as it can be a pre-cursor to dementia. However, the diagnosis of MCI can be quite problematic and can

come long after initial onset. Here, we sought to use a new technology we have previously validated for research – mobile electroencephalography (mEEG) – to measure brain function to see if we could rapidly detect differences in brain activity between people with and without MCI. Methods: Participants (60: mean age 65) were recruited for a control (30) and an MCI group (30). All participants were screened for MCI using standard RBANS and the MOCA assessments. Participants completed a standard n-Back assessment of working memory while mEEG data was recorded. A key feature here is that we used mEEG technology thus application of the device and the n-Back test was completed in under 10 minutes for each participant. Results: Our key finding is that we observed increased frontal mEEG theta power (brain oscillations between 4 and 7 Hz) for MCI participants relative to controls (p < 0.001). Conclusions: Importantly, our work demonstrates a potential novel rapid brain-based assessment for MCI that would afford earlier detection of disease onset.

EPILEPSY AND EEG

P.106

Impact of comorbid sleep disorders in patients with epilepsy on mortality risk

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Background: Pooled mortality has been observed to be almost threefold among people with epilepsy (PWE). Among PWE, epilepsy related deaths (including sudden death in epilepsy (SUDEP)), are commoner than other causes. Among these, around 16-36% are SUDEP, of which 80% events occur during sleep. SUDEP risk is most measured using the SUDEP Risk Inventory. To prevent SUDEP and reduce epilepsy related mortality, we need a better understanding, not only of the components of this screening inventory, but also additional clinical and neurophysiologic parameters that might be commoner among PWE and potentially associated with higher mortality risk. Methods: Patients diagnosed with active epilepsy over the last 3 years will form the study population, categorized into two groups: PWE with a comorbid sleep disorder, and PWE without diagnosis of a sleep disorder. Descriptive statistics will be used to report clinic and neurophysiologic characteristics of subjects enrolled. Results: We hypothesize that there is a significantly increased prevalence of sleep comorbidity among people with epilepsy compared to the general population. Poorer sleep quality could potentially have an association with higher mortality risk among epilepsy patients, Conclusions: We hope to identify and to add sleep factors such as primary sleep disorders and sleep disturbances to already established SUDEP-7 parameters.

MS/NEUROINFLAMMATORY DISEASE

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Personalized prediction of future lesion activity and treatment effect in multiple sclerosis from baseline MRI

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Background: Precision medicine for multiple sclerosis (MS) involves choosing a treatment that best balances efficacy and disadvantages such as side effects, cost, and inconvenience, based on an individual's unique characteristics. Machine learning can be used to model the relationship between a baseline brain MRI and future new and enlarging T2 (NE-T2) lesion count to provide personalized treatment recommendations. Methods: We present a multi-head, deep neural network for making individualized treatment decisions from baseline MRI and clinical information which (a) predicts future NE-T2 lesion counts on multiple treatments and (b) estimates the conditional average treatment effect (CATE), as defined by the predicted suppression of NE-T2 lesions, between different treatment options and placebo. We validate our model on a dataset pertaining to 1817 patients from four randomized clinical trials. Results: Our model predicts favorable outcomes (< 3 NE-T2 at follow-up) with average precision 0.780-0.994 across 5 different treatment arms. It correctly identifies subgroups with different treatment effect sizes and provides treatment recommendations that improve lesion suppression while limiting the need for high efficacy treatments. Conclusions: Our framework provides accurate predictions for future NE-T2 lesion counts and personalized treatment recommendations that improve outcomes while accounting for the disadvantages of different treatment options.

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Use of intravenous immunoglobulin for central nervous system disorders in British Columbia: consensus guidelines

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Background: Intravenous immunoglobulin (IVIG) may benefit many inflammatory central nervous system (CNS) disorders based on multiple immunomodulatory effects. IVIg is being used in inflammatory CNS conditions however robust evidence and guidelines are lacking in many disorders. Over the last 5 years,