Clinical Neurophysiology (CSCN) Epilepsy and EEG

P.085

Exploring the efficacy and safety of perampanel in epilepsia partialis continua: a case series

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Background: Epilepsia partialis continua (EPC) is a form of focal status epilepticus, often requiring multiple anti-seizure medications (ASM). There are no established guidelines for pharmacological management. Perampanel (PER), an AMPA receptor antagonist, has gained attention in treating status epilepticus based on limited case reports. This study evaluates the efficacy of PER in treating EPC. Methods: We retrospectively analyzed the treatment response and adverse effects of PER in patients with EPC at our local hospital from January 2024 to January 2025. Seven patients with EPC were included. The loading dose of PER ranged from 6 mg to 20 mg. The etiology of EPC was intracranial hemorrhage (70%) and glioblastoma (30%). A clinical response was defined as seizure freedom within 72 hours of initiating PER, with PER being the last ASM added. Results: PER resulted in seizure termination in 6 of 7 patients. Time to response ranged from 24 to 72 hours. Oral PER, up to a dose of 16 mg, was well-tolerated in conscious patients. Common side effects included sedation, delirium, agitation, and nausea. Conclusions: Our real-world data suggest that PER can be an effective and well-tolerated early adjunct therapy in EPC, particularly at higher oral loading doses in conscious patients.

P.086

Randomized controlled trial evaluating virtual reality exposure therapy on epilepsy/seizure-specific interictal anxiety in people with epilepsy

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Background: Over 28% of people with epilepsy (PwE) experience anxiety related to their seizures, yet research on interventions for epilepsy-specific (ES) interictal anxiety remains limited. The community-based pilot, 'AnxEpi-VR,' tested virtual reality exposure therapy (VR-ET), showing potential effectiveness and laying the groundwork for evaluating its impact on ES-anxiety in the present randomized controlled trial. Methods: Fourteen PwE admitted to the Epilepsy Monitoring Unit at Toronto Western Hospital used a 360-degree VR-intervention twice daily for five minutes up to ten days. The control group (n=7) viewed neutral VR environments (e.g., beach, forest scenes), while the experimental group (n=7) experienced VR-ET targeting ES anxiety (e.g., subway seizure scenarios). Data was collected at baseline, pre and post-VR exposure, post-intervention, and one-month follow-up using self-report questionnaires, semi-structured interviews, and VR-usage metrics. Clinicaltrials.gov NCT06028945. Results: At baseline, 71% of the control group and 83% of the exposure group had a brEASI score ≥7, indicative of an anxiety disorder. Post-intervention, this decreased to 57% and 50%, respectively. The average Fast Motion Sickness rating was 1.29, indicating minimal motion sickness. Of the exposure participants, 71% felt the scenarios simulated their real-world anxiety triggers. Conclusions: VR-ET was well-tolerated in PwE. Future recommendations include diversifying scenarios, adding interactive features, and improving software connectivity.

P.087

Methods for representing dipole distribution in high-density EEG source localization for focal epilepsy: a systematic analysis

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Background: Routine electroencephalography (EEG) provides excellent temporal resolution for evaluation of focal epilepsy, but lacks spatial resolution. High-density-EEG (HDEEG)-based source-localization significantly enhances spatial resolution, but requires greater standardization. We systematically review HDEEG systems, methods, and metrics utilized for evaluating focal epilepsy. Methods: A systematic search was conducted in PubMed using PRISMA guidelines with keywords "HDEEG" or "high-density EEG", "source localization and "focal epilepsy". Inclusion criteria: studies from the last 20 years, human subjects with focal epilepsy, sample size ≥ 10 and HDEEG with source localization methods clearly described. Results: 37 of 65 studies fulfilled inclusion criteria, with most reporting N<50. Most studies (14) used a 256-electrode HDEEG setup; 10 used 128-electrode configurations, and 6 used 76–83 electrodes. EEG source localization most commonly used Cartool (N=12) and Curry (N=5) softwares. Standard MRIs were used in 25 studies, and customized MRIs in 12. Metrics like clustering coefficient were reported to represent dipole distribution (10 studies); while functional connectivity analysis was reported in 7 studies. Conclusions: Variations in software choice, metrics for dipole distribution assessment, and MRI integration are evident from the current literature. Clustering methods and functional connectivity metrics are most commonly employed to represent dipole distribution, reflecting their increasing utility in understanding brain networks.