Cingulate epilepsy

Diagnostic challenges exist in the presurgical evaluation of patients with magnetic resonance imaging (MRI) negative cingulate epilepsy (CE) because of the heterogeneity in clinical semiology and lack of localizing findings on scalp electroencephalographic (EEG) recordings.

Sun et al. aimed to examine the neuroimaging characteristics in a consecutive cohort of patients with MRI-negative CE with a focus on two image post-processing methods, including the MRI post-processing morphometric analysis program (MAP) and 18F-fluorodeoxyglucose-positron emission tomography-MRI (PET/MRI) co-registration.

Included in this retrospective study were patients with MRI-negative CE who met the following criteria: negative on preoperative MRI, invasive EEG (iEEG) confirmed cingulate gyrus-onset seizures, surgical resection of the cingulate gyrus with/without adjacent cortex, and seizure-free for more than 12 months. MAP and PET/MRI co-registration were performed and investigated by comparison to ictal intracranial EEG findings. Other characteristics obtained from scalp EEG, magnetoencephalography (MEG), iEEG, and pathological study were also reported.

Ten patients were included, of which eight were diagnosed with anterior CE, one with middle CE, and one with posterior CE. The semiology included fear, embarrassment, vocalization, ictal pouting, asymmetric tonic posture, hypermotor, and automatism. Scalp EEG revealed unilateral or bilateral frontal-temporal onset. MEG localized the dipoles correctly in one patient (1/10). MAP detected subtle abnormalities in regions concordant with iEEG onset in seven patients (7/10) while PET/MRI co-registration revealed focal concordant hypometabolism in five patients (5/10). Combining MAP with PET/MRI co-registration improved the detection rate to 90 % in this cohort. The pathology was focal cortical dysplasia (FCD), including FCD type IIA in three, type IIB in three, and type I in four.

Morphometrics and PET/MRI co-registration show promising results in identifying subtle focal cortical dysplasia (FCD) abnormalities in cingulate epilepsy (CE) with negative results on conventional MRI, which can be otherwise challenging. More importantly, a combination of MRI post-processing and PET/MRI co-registration can greatly improve the identification of epileptic abnormalities, which can be used as a surgical target. MAP and PET/MRI co-registration should be incorporated into the routine presurgical evaluation [1)].

1)
Sun K, Ren Z, Yang D, Wang X, Yu T, Ni D, Qiao L, Xu C, Gao R, Lin Y, Zhang X, Shang K, Chen X, Wang Y, Zhang G. Voxel-based morphometric MRI post-processing and PET/MRI co-registration reveal subtle abnormalities in cingulate epilepsy. Epilepsy Res. 2021 Feb 8;171:106568. doi: 10.1016/j.eplepsyres.2021.106568. Epub ahead of print. PMID: 33610065.