Stroke

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Abstract WP216: Cortical Network Dynamics in Acute Ischemic Stroke

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Abstract

INTRODUCTION: Measures of brain function are a unique source of insight into stroke effects, but the most commonly used methods (fMRI, PET) are difficult to implement in acutely ill patients, and so little is known about changes in brain function in the days after stroke. Advances in dense-array electroencephalography (dEEG) make possible the study of cortical network dynamics at the bedside. The current study addressed the hypothesis that changes in the motor network are measurable in first days post-stroke, and that these network changes are related to behavioral deficits.

METHODS: Nine patients with acute (<120 hours) ischemic stroke underwent dEEG and behavioral testing that included Box & Blocks score (1 min). The dEEG signals from 256 scalp leads were recorded at 1000Hz, along with bilateral forearm EMG, during cued 0.14 Hz wrist flexions. Nine age-matched healthy controls underwent the same assessments. Cortical network dynamics were assessed in the motor system using EEG coherence between leads, focusing on β range (20-30 Hz) signals. Spectral power in this range was also obtained.

RESULTS: Patients were 62±13 years old, with median NIHSS score=3 (range 1-12), and could move 26±18 blocks (range 0-50) on the Box & Blocks test, fewer than controls (59±7 blocks, p<0.0001). In patients, as compared to controls, the region overlying ipsilesional hand motor cortex showed increased coherence with [A] contralesional hand motor cortex (0.13±0.06 vs 0.07±0.05, p=0.03) and [B] supplementary motor area (0.27±0.12 vs 0.15±0.07, p=0.02) during flexion of the affected wrist. Spectral power did not differ between groups in these regions. Across all subjects, the magnitude of coherence between hand motor cortex and supplementary motor area was inversely related to Box & Blocks score (r=-0.61, p=0.008).

CONCLUSIONS: Assessment of cortical dynamics in the motor system is feasible in the acute stroke setting, with hemiparetic patients demonstrating significantly increased β coherence. Increased EEG coherence between two motor cortex regions after stroke might reflect increased functional connectivity due to the reduced cortical inhibition that is seen early after stroke, effects of deafferentation, or increased input from a common area such as the thalamus.

Footnotes

Back to top