Relation between asymmetry of prefrontal cortex activity and orthostatic hypotension in post-stroke patients with conscious disorder

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Abstract: The post-stroke patients with conscious disorders suffer from various disorders of the autonomic nervous system (ANS) including orthostatic hypotension. In order to evaluate the neurophysiological mechanism of ANS disorder in the patients, we evaluated the relation between orthostatic hypotension and the prefrontal cortex (PFC) activity, which plays a role in stress-induced ANS responses [1]. Employing NIRS, we measured oxyhemoglobin (oxy-Hb) concentration changes in the bilateral PFC at rest for 10 min in eight patients (70.8 ± 11.8 years). We calculated the Laterality Index at Rest (LIR) as follows: $LIR=\frac{\Sigma t\{(\Delta oxyRt-\Delta oxyRmin)-(\Delta oxyLt-\Delta oxyLmin)\}}{\Sigma t\{(\Delta oxyRt-\Delta oxyRmin)+(\Delta oxyLt-\Delta oxyLmin)\}}$

LIR>0 indicates right dominant activity, while LIR<0 indicates left dominant activity. Then, subjects were placed on a tilt table bed, and received passive standing test. We observed a significant positive correlation between LIR before standing test and oxy-Hb changes during standing test ($r=0.78$, $p=0.02$). Four patients, who suffered orthostatic hypotension, showed right dominant PFC activity before standing test. There was no significant correlation between LIR and changes of blood pressure, heart rate during standing test, suggesting that the auto regulation was impaired in the patients. The present results suggested the patients with right dominant PFC activity at rest dominate sympathetic activity for maintaining CBF during standing test since the right PFC plays a role in sympathetic activity during stress tasks [1].

References

[1] Sakatani K Adv Exp Med Biol. 2012;737:89-95.