Sevoflurane modifies information transfer across the cerebral cortex

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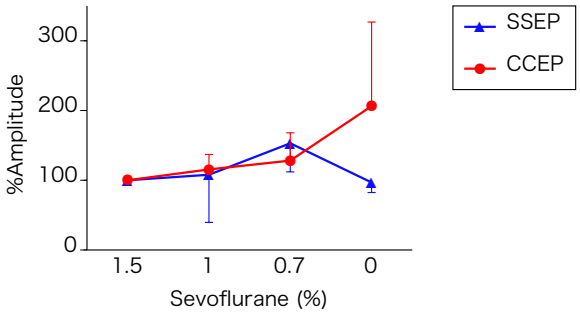
Introduction. Peripheral sensory information reaches the cerebral cortex and induces sensory evoked potentials even under general anesthesia. General anesthesia might possibly induce loss of consciousness by inhibiting sensory information integration at the cerebral cortex resulting in the failed perception of sensation.[1] Propofol[2] and midazolam[3] suppressed activity at the parietal sensory association cortex and transcortical information transfer, respectively. To obtain direct evidence of transcortical suppression, we examined electrocorticogram and corticocortical evoked potentials by grid electrodes under general anesthesia.

Methods. Three adult patients underwent implantation of cortical grid electrodes to localize epileptic foci. Several cortical grids were placed on the cortical surface over suspected epileptic foci under sevoflurane anesthesia. End-tidal sevoflurane concentration was kept at 1.5%, sedation evaluated with modified observer's assessment of alertness/sedation scale (mOAA/S); and somatosensory (SSEP), corticocortical evoked potentials (CCEP), and spontaneous electrocorticogram (ECoG) were recorded. The same observation and recording were repeated at 1.0%, 0.7%, and 0% of sevoflurane concentration.

Results. The patients regained consciousness at 0.7% or 0% of sevoflurane with the mOAA/S scores of 4-5. The CCEP, but not SSEP, amplitude increased remarkably on awakening (Figure). The ECoG showed the minimum cross-electrode coherence and phase reversal at 1% of sevoflurane.



Conclusion. Sevoflurane affected the corticocortical information transfer as evidenced by the CCEP and ECoG coherence. Sevoflurane-induced unconsciousness could possibly involve suppression of corticocortical information transfer.

Keywords: Consciousness; sevoflurane; electrocorticogram; evoked potentials

Acknowledgement: This work was supported by the departmental fund.

References: [1]Kurata J. Masui 2011; 60: 566-73 [2]Fiset P, et al. J Neurosci 1999; 19: 5506-13 [3]Ferrarelli F, et al. PNAS 2010; 107: 2681-6