

SPECTRAL ANALYSIS OF THE EEG-SIGNAL REGISTERED DURING ANAESTHESIA INDUCED BY PROPOFOL AND MAINTAINED BY FLUORINATED INHALATION ANAESTHETICS

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Abstract

The aim of this study was to identify the effects of different volatile anaesthetics (isoflurane, desflurane or sevoflurane) on the spectro-temporal pattern of EEG during all of the stages of anaesthesia recorded at the frontal derivations in 64 adult patients. The relative powers of EEG for delta, theta, alpha and beta frequency bands as well as the characteristics of their time evolution and their relationships with the concentrations of anaesthetics were used as the EEG spectra indices. The time evolutions of the individual wave powers in 75% of patients were similar for all the anaesthetics used in this study at the same method of administration. Well correlated biphasic changes in the slow and fast wave powers emerged after propofol induction as well as in association with the volatile anaesthetics action. Wave powers as well as their relationships with the anaesthetic concentrations were not hampered by the variability across the patients and anaesthetics used in this study. Comparing the branches of increasing and decreasing concentration, the hysteresis phenomenon, i.e. systematic decrease or increase of each wave power, was observed at the end of anaesthesia for each of the volatile anaesthetics. A rapid increase of sevoflurane concentration at the initial phase of anaesthesia caused more effective attenuation of beta waves than in the case of gradual anaesthetic administration but it happened at the cost of the intensification of delta waves.

Keywords: EEG-signal, volatile anaesthesia, fluorinated inhalation anaesthetics, isoflurane, desflurane, sevoflurane, spectral analysis, biphasic effect, hysteresis