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Titel des Beitrags:
Differences between state entropy and bispectral index during analysis of identical electroencephalogram signals: a comparison with two randomised anaesthetic techniques.

Abstract:
It is claimed that bispectral index (BIS) and state entropy reflect an identical clinical spectrum, the hypnotic component of anaesthesia. So far, it is not known to what extent different devices display similar index values while processing identical electroencephalogram (EEG) signals. To compare BIS and state entropy during analysis of identical EEG data. Inspection of raw EEG input to detect potential causes of erroneous index calculation. Offline re-analysis of EEG data from a randomised, single-centre controlled trial using the Entropy Module and an Aspect A-2000 monitor. Klinikum rechts der Isar, Technische Universität München, Munich. Forty adult patients undergoing elective surgery under general anaesthesia. Blocked randomisation of 20 patients per anaesthetic group (sevoflurane/remifentanil or propofol/remifentanil). Isolated forearm technique for differentiation between consciousness and unconsciousness. Prediction probability (PK) of state entropy to discriminate consciousness from unconsciousness. Correlation and agreement between state entropy and BIS from deep to light hypnosis. Analysis of raw EEG compared with index values that are in conflict with clinical examination, with frequency measures (frequency bands/Spectral
Edge Frequency 95) and visual inspection for physiological EEG patterns (e.g. beta or delta arousal), pathophysiological features such as high-frequency signals (electromyogram/high-frequency EEG or eye fluttering/saccades), different types of electro-oculogram or epileptiform EEG and technical artefacts. PK of state entropy was 0.80 and of BIS 0.84; correlation coefficient of state entropy with BIS 0.78. Nine percent BIS and 14% state entropy values disagreed with clinical examination. Highest incidence of disagreement occurred after state transitions, in particular for state entropy after loss of consciousness during sevoflurane anaesthesia. EEG sequences which led to false ‘conscious’ index values often showed high-frequency signals and eye blinks. High-frequency EEG/electromyogram signals were pooled because a separation into EEG and fast electro-oculogram, for example eye fluttering or saccades, on the basis of a single EEG channel may not be very reliable. These signals led to higher Spectral Edge Frequency 95 and ratio of relative beta and gamma band power than EEG signals, indicating adequate unconscious classification. The frequency of other artefacts that were assignable, for example technical artefacts, movement artefacts, was negligible and they were excluded from analysis. High-frequency signals and eye blinks may account for index values that falsely indicate consciousness. Compared with BIS, state entropy showed more false classifications of the clinical state at transition between consciousness and unconsciousness.