Dokumenttyp: journal article

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Titel des Beitrags: Time delay of electroencephalogram index calculation: analysis of cerebral state, bispectral, and Narcotrend indices using perioperatively recorded electroencephalographic signals.

Abstract: BACKGROUND: Monitoring of anaesthetic depth with EEG-derived indices may detect EEG changes associated with awareness and thereby help to decrease the incidence of intraoperative awareness with postoperative recall. All currently available monitors need varying time periods to calculate a new index when reacting to changes in anaesthetic depth. The exact time delay for calculation of new index values is unknown. In a previous study, we used simulated EEG signals and found considerable time lags for the cerebral state index (Danmeter, Odense, Denmark), the bispectral index (Aspect Medical Systems Inc., Newton, MA, USA), and the Narcotrend index (MonitorTechnik, Bad Bramstedt, Germany). The aim of this study was to investigate whether the time delays observed with simulated EEG signals also applied to real EEG data. METHODS: We used perioperatively recorded EEG data from a database corresponding to the awake state, general anaesthesia, and suppression of cortical activity, respectively. After a switch from one state of consciousness to another, the time necessary for all indices to adjust the index value to the underlying input signal was measured. RESULTS: We found time delays for all indices between 24 (7) and 122 (23) s before the new state was indicated. In accordance with our previous results, these time delays
were not constant and depended on the particular starting and target index value. Results were different for decreasing and increasing values. CONCLUSIONS: Our results may show a limitation of the value of electronic EEG indices in prevention of awareness with recall. Furthermore, due to different time delays for ascending and descending values, the results of pharmacodynamic studies may be influenced by this phenomenon.

Zeitschriftentitel / Abkürzung:
Br J Anaesth

Jahr:
2009

Band:
103

Heft / Issue:
3

Seiten:
394-9

Sprache:
eng

Pubmed:

Print-ISSN:
0007-0912

TUM Einrichtung:
sthesiologie

Occurences:
- Einrichtungen > Fakultäten > Fakultät für Medizin > Kliniken und Institute > Klinik für Anästhesiologie > Klinik für Anästhesiologie (DHM) > 2009

entries: