

Detection of Cerebral Electroencephalographic Patterns After Median Nerve Stimulation During Propofol-Induced General Anesthesia : a Prospective Interventional Cohort Study

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Objective: The main purpose of this study is to prevent accidental awareness by evaluating the modulations of amplitude in the EEG signal over the motor cortex.

Background: Devices used to assess depth of anesthesia and clinical parameters may not be sufficient to prevent intraoperative accidental awareness¹. An alternative would be to detect the patient's intention to move in order to alert the medical staff². We believe that the data obtained after multiple median nerve stimulation (MNS) during general anesthesia will help us to prevent intraoperative awareness².

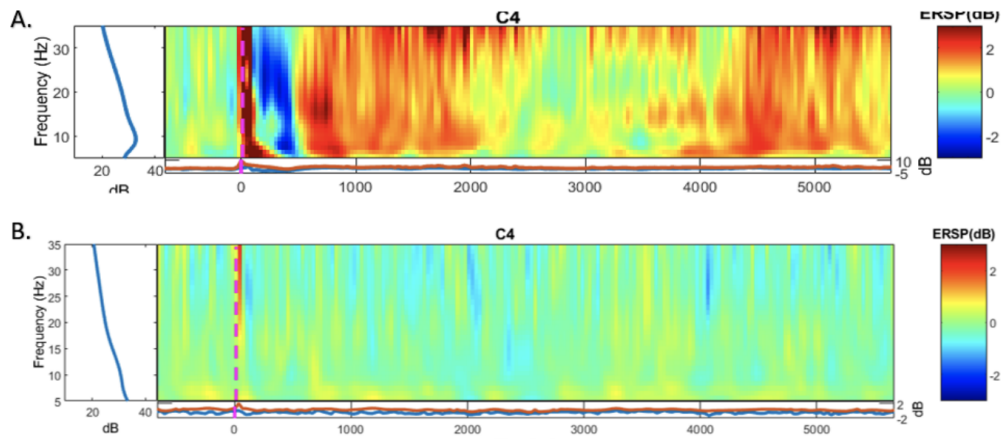
Methods: In this prospective, interventional trial, 30 volunteers aged from 18 to 81 years with informed consent will be enrolled for scheduled surgery from 15th January 2023 to 31st December 2026. Are excluded patients who are allergic to propofol or have a history of anaphylactic reaction, pregnant women and patients with a psychiatric disease. This study is approved by the CHU Brugmann ethical committee (CE 2021/225) and is registered at EUDRACT (2021-006457-56) and ClinicalTrials.gov (NCT05272202). EEG data based on MNS is first recorded with the patient awake, then a second recording is made under general anesthesia during the surgery. MNS is obtained by electrodes placed on the wrist. EEG signal is acquired by using a TMSi 64-channel system covering the scalp. An EEG amplifier records the changes in ERD (event-related desynchronization) and ERS (event-related synchronization) patterns at various concentrations of propofol delivered by a target-controlled infusion pump. The primary endpoint is the comparison of the average maximal values of amplitude of the ERD/ERS at rest and at various concentrations of propofol. The average ERDs max and ERSs max are compared with a Student t-test ($P < 0.05$).

Results: Our intermediate results ($n=4$ curarized patients) shows the ERS in the mu/beta frequency band after MNS before general anesthesia (Fig. 1A). After propofol induction, the post-stimulation ERS disappears significantly (Fig. 1B; $P < 0.01$ with FDR correction).

Conclusions: The preliminary data extracted from the ERD/ERS consecutive to MNS seems to disappear with high concentration of propofol contrary to previous studies at lower levels². Therefore, this study is not conclusive in terms of the ERD/ERS patterns used but other EEG features (i.e., brain connectivity, somatosensory evoked potential) could be investigated and will be the subject of future research.

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Figure 1 :



- A. Positive ERSP indicates synchronization (ERS) in red, negative ERSP indicates desynchronization (ERD) in blue in the resting condition.
- B. ERD and ERS signals disappearance under general anesthesia

References:

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