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Perioperative Factors Associated with EEG Suppression in Older Surgical Patients

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BACKGROUND: Postoperative delirium (POD) is a frequent complication in older patients, which has been shown to be associated with intraoperative EEG suppression1. Studies have extensively considered associations between perioperative factors and POD, but there is limited data on factors associated with EEG suppression2, including preoperative cognitive impairment and functional disability. The aim of this study is to address which factors are associated with intraoperative EEG burst suppression.

METHODS: We combined data from two prospective cohort studies where intraoperative processed EEG was used but the monitoring data were blinded to the treating anesthesiologists. All patients aged ≥ 40 years underwent non-cardiac surgery at UCSF, with postoperative hospital stay ≥ 2 days. Baseline cognitive functioning was measured using the Telephone Interview of Cognitive Status (TICSTM), those with scores ≤ 31 met criteria for cognitive impairment. Depression was assessed using the Geriatric Depression Scale (GDS) with a score of six meeting criteria for depression. Intraoperatively, patients were monitored with the Patient State Index (PSITM) and the burst-suppression ratio, used to compute percent time spent in EEG suppression. The perioperative factors considered for analysis included TICS score, instrumental activities of daily living (IADL) score, GDS score, and surgical risk. Percent EEG suppression was discretized to have integer valuation and used as the dependent variable in multivariate negative binomial regression to determine associations with perioperative factors.

RESULTS: A total of 166 patients were included in the final analysis, with 131 patients being 65 years or older. The patients had a mean age of 68.7 years (SD 8.0), 51% were male, and 63% received either spinal or other types of orthopedic surgery. 24 patients had TICS ≤ 31, and 26 met GDS criteria for depression. The mean percent time of EEG suppression was 6.9% (SD 10.4%). A lower TICS was shown to be associated with greater percent time spent in EEG suppression ($p < 0.01$), along with lower IADL score ($p < 0.05$), after controlling for demographic characteristics and surgical risk.

CONCLUSION: Our data demonstrates that preoperative cognitive impairment and lower IADL score, are associated with increased percent EEG suppression. These factors not previously described by prior studies may affect the reported relationship between EEG suppression and POD1 and have major implications for assessing risk for postoperative outcomes.

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