Evaluation of patient state index, bispectral index, and entropy during drug induced sleep endoscopy with dexmedetomidine

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Multiple electroencephalographic (EEG) monitors and their associated EEG markers have been developed to aid in assessing the level of sedation in the operating room. While many studies have assessed the response of these markers to propofol sedation and anesthetic gases, few studies have compared these markers when using dexmedetomidine, an alpha-2 agonist. Fifty-one patients underwent drug induced sleep endoscopy with dexmedetomidine sedation. Continuous EEG was captured using SedLine (Masimo, Inc), and a playback system was used to extract the bispectral index (BIS) (Medtronic Inc), the patient state index (PSI) (Masimo, Inc), the state and response Entropy (GE Healthcare), and calculate the spectral edge frequency 95% (SEF95). Richmond Agitation-Sedation Scale (RASS) scores were assessed continually throughout the procedure and in recovery. We assessed the correlation between EEG markers and constructed ordinal logistic regression models to predict the RASS score and compare EEG markers. All three commercial EEG metrics were significantly associated with the RASS score ($p < 0.001$ for all metrics) whereas SEF95 alone was insufficient at characterizing dexmedetomidine sedation. PSI and Entropy achieved higher accuracy at predicing deeper levels of sedation as compared to BIS (PSI: 58.3%, Entropy: 58.3%, BIS: 44.4%). Lightening secondary to RASS score assessment is significantly captured by all three commercial EEG metrics ($p < 0.001$). Commercial EEG monitors can capture changes in the brain state associated with the RASS score during dexmedetomidine sedation. PSI and Entropy were highly correlated and may be better suited for assessing deeper levels of sedation.