Comparative Evaluation of Electroencephalographic Patient State Index (PSI) and Bispectral Index (BSI) Values during Ambulatory Anesthesia.

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Introduction

The patient state index (PSI) has been demonstrated to be a useful EEG-based monitor for assessing consciousness during general anesthesia (1). However, concerns regarding the time required to apply the PSI electrodes necessitated the development of a new electrode system (PSArray2). We designed this study to compare the clinical utility, as well as the sensitivity and specificity of the PSI with the PSArray2 electrode system to the EEG bispectral index (BIS) using the XP platform. In addition, their ability to predict the level of consciousness during induction and emergence from general anesthesia were evaluated.

Methods

19 consenting outpatients scheduled for laparoscopic surgery were enrolled in this prospective study. After application of both the PSI and BIS electrode systems, anesthesia was induced with propofol, 2 mg/kg IV, and fentanyl 1 μg/kg IV. Desflurane 2-6% endtidal in combination with N2O 60% was administered for maintenance of anesthesia. The times to display the values from both monitors, and the comparative PSI and BIS values at specific time intervals during the induction and emergence periods were recorded (means+SD, with a= $p<0.05$ vs BIS value; and b= $p<0.05$ vs baseline value).

Results

Both the BIS and PSI values were found to predict the level of consciousness ($p<0.01$). The area under the receiver operating characteristic (ROC) curve for detection of consciousness indicated a similar performance with the PSI (0.98±0.05) and the BIS (0.97±0.05). The PSI exhibited a good correlation with the BIS during both the induction ($r = 0.84$) and emergence ($r = 0.74$) periods. Although application of the PSI electrode required slightly more time than BIS (17±6 vs 13±6 sec, $p>0.05$), the time to display the PSI value was slightly shorter than with the BIS ($p>0.05$). The PSI index also experienced less interference from the electrocautery during surgery (32% vs 72%).

Discussion

The PSI monitor with the newer electrode system appears to possess similar sensitivity and specificity to the BIS monitor in assessing consciousness during induction and emergence from anesthesia. Given the similar time required to apply the electrodes and displayed the value with both EEG monitors, it would appear that the PSI monitor is a viable alternative to the BIS monitor in the ambulatory setting.

(1) Anesth Analg. 2002;95:1669-74