Patient State Index Assesses Arousal Level

Gugino, L., Chabot, R., Aglio, L., Prichep, L., Formanek, V. *Anesthesiology* 2001; 95:A282

Introduction

The patient state index (PSI™) is a multivariate value calculated from selected parameters derived from processed EEG. This index was designed to represent the probability that a patient undergoing general anesthesia is awake and varies from 0 to 100 percent. This report shows the correlation of the PSI with changes in the level of arousal across four different anesthetic protocols.

Methods

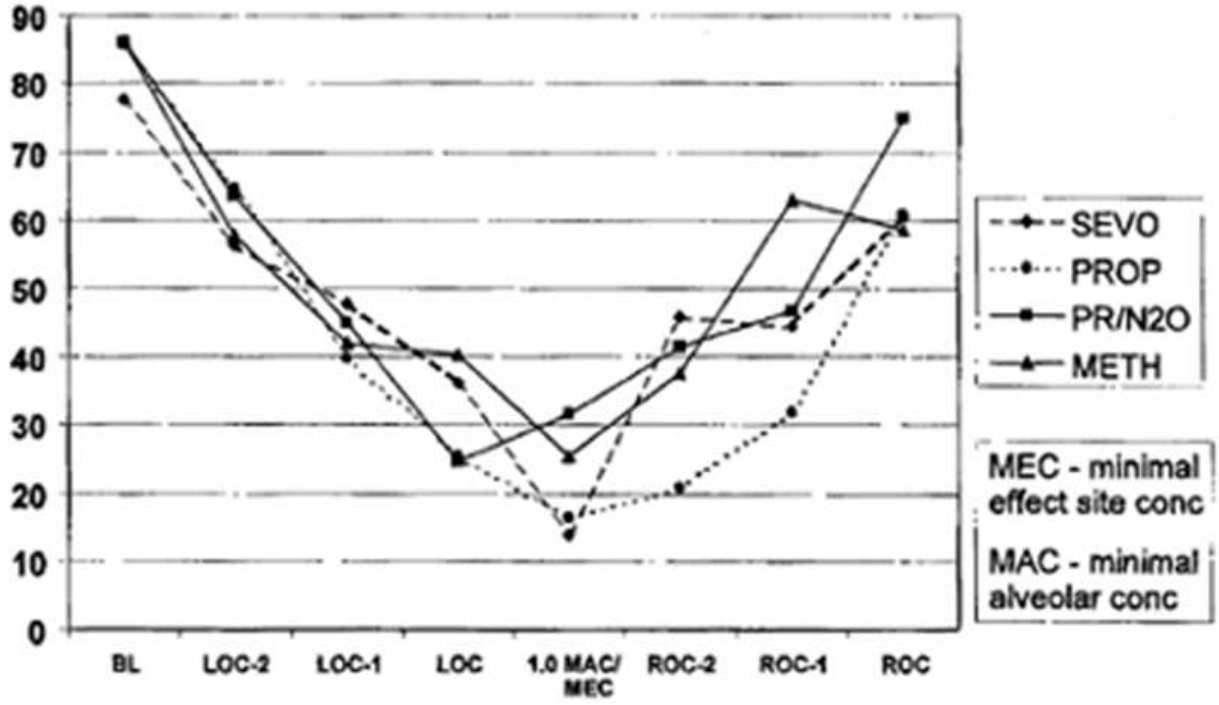
Sixteen ASA I volunteers (M=8, F=8) were recruited for this IRB approved study. Induction and recovery of general anesthesia used targeted stepped changes of four different hypnotic agents on different occasions separated by at least 1 month. The agents included propofol (N=14) sevoflurane (N=14), methohexital (N=6) and N2O (N=16). Targeted effect site changes for intravenous agents used the StanPump technique and end-tidal concentration guided the changes for sevoflurane and a N2O maintenance phase following a propofol induction. The step sizes were 0.1 age adjusted MAC or minimal effect site concentration (MEC) for 50% movement suppression. After equilibration a modified OAS/S score was then used for assessing the levels of arousal. After loss of consciousness (LOC) all agents were increased to 1.4 MAC/MEC for intubation. Anesthetic administration was then decreased in .1 MAC/MEC steps until return of consciousness (ROC.

Multichannel EEG was acquired throughout and saved with appropriate event marks to optical disc. Off-line, the EEG acquired from FP, FP2, FPz, Cz and Pz were replayed and PSI values were calculated. One-way ANOVAs and Duncan multiple comparisons were used for assessing the relationship of changes in PSI and arousal levels at LOC and ROC.

Results

Figure 1 presents mean PSI values calculated at baseline (BL), one and two arousal levels prior to LOC (LOC-1, LOC-2) and ROC (ROC-1, ROC-2) and 1.0 MAC/MEC separately for each anesthetic agent. All ANOVAs calculated across these time intervals were significant with ($p < .0001$). PSI values at ROC remained lower than BL PSI values ($p< .02$) for all anesthetics except N2O where they returned to baseline levels ($p=.13$).

Figure 1


90
80
70
60
50
40
30
20
10
0
BL
LOC-2
LOC-1
LOC
1.0 MAC/ MEC
ROC-2
ROC-1
ROC
SEVO
PROP
PR/N2O
METH
MEC - minimal effect site conc
MAC - minimal alveolar conc