Prospective Comparison of Global Electroencephalogram to Frontal Sedline Electroencephalogram Monitoring for the Evaluation of Intraoperative Burst Suppression During Elective Intracranial Surgery.

Nasseri-Noori K.A., McIvor D., Hsu F., Olson M., Allard M., Losey T., Macknet M., Applegate R. *Proceedings of the 2011 Annual Meeting of the American Society of Anesthesiologists*. A499.

Background

Patients are at risk for injury to normal brain tissue when undergoing craniotomy. In some settings administration of drugs to implement intraoperative burst suppression therapy (IBST) on electroencephalography (EEG) is used to lessen ischemic injury related to surgical manipulation of the brain. Our objective is to compare frontal PSA EEG (SedlineTM) to the standard global EEG monitor as a tool for IBST detection during craniotomy or transphenoidal pituitary resection.

Methods

This is an ongoing investigator initiated, IRB approved prospective trial performed in adult patients undergoing scheduled intracranial surgery in which IBST has been requested by the surgeon. To date, 15 ASA class 1-3 subjects between 18-90 years of age, without seizure disorder, undergoing elective craniotomy or transphenoidal pituitary resection were enrolled. Burst suppression was defined as a range of 50% suppression to a maximum suppression of complete brain electrical silence for one minute and was both initiated and maintained with propofol. Real time comparison of the standard EEG and PSA array EEG was accomplished after the surgeon called for IBST to start. Level of suppression was divided into three groups; incomplete suppression, burst suppression, or complete suppression (isoelectric). Agreement between assigned groups was compared by Chi square at 5 minute intervals.

Results

Of the 15 subjects enrolled, 5 subjects failed secondary to surgical conditions. In the remaining 10 patients, 272 data points were collected, with 93% overall correlation between PSA array and EEG, ($p<0.001$ Chi square). There were 19 discordant events; in 16 events a PSA isoelectric pattern occurred while EEG displayed a nearly isoelectric pattern, (table 1). Of the 3 remaining events 1 occurred when the PSA group called IBST start after the EEG group, another occurred when the PSA group diagnosed IBST start before EEG group and the last when the PSA group called the end of IBST before the EEG group. The management impact of the discordant events is summarized in Table 2.

Discussion

These results show PSA IBST detection has a strong agreement with standard EEG. None of the 19 discordant events would have altered IBST management given the overall trend; in 16 instances the PSA group correctly diagnosed an excessively deep IBST pattern given a nearly isoelectric EEG. The remaining 3 events can be explained by a short lag in diagnosis when IBST start and stop occurred. Given these results the PSA monitor requires further analysis to determine its overall usefulness in this setting.

	Standard EEG 0	Standard EEG 1	Standard EEG 2
PSA EEG 0	65 (23.9%)	2 (0.1%)	0
PSA EEG 1	1 (0.05%)	183 (67.3%)	0
PSA EEG 2	0	16 (5.9%)	5 (1.8%)

Table 1: PSA vs. EEG;
0 = Incomplete Suppression
1 = Burst Suppression Pattern
2 = Isoelectric Pattern

Type of discordance	Infusion change per PSA EEG guidance	Infusion change per Standard EEG guidance	Comment	Assessment of PSA guidance
PSA EEG 0; EEG 1 N=2	Increase	Maintain	1 event entering IBST; 1 event after request to end IBST	**Likely correct guidance:** since occurred during IBST start/stop
PSA EEG 1; EEG 0 N=1	Maintain	Increase	Both monitors show IBST at the next interval	**Possible delayed guidance**
PSA EEG 2; EEG 1 N=16	Decrease	Maintain	Standard EEG with minimal burst activity; EEG tech comment "could be lighter"	**Likely Correct guidance:** Nearly complete suppression on standard EEG