ISSN: 0975-3583, 0976-2833 VOL9, ISSUE3, 2018

Original Research Article

OBSERVATION OF BIS TO ASSESS THE LEVEL OF CONSCIOUSNESS AND DEPTH OF ANAESTHESIA THROUGHOUT THE PERIOD OF BALANCED GENERAL ANAESTHESIA.

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Abstract

Background & Methods: The aim of the study is to Observation of BIS to assess the level of consciousness and depth of anaesthesia throughout the period of balanced general anaesthesia. During the above said study period, 100 patients posted for elective general surgeries under general anaesthesia underwent continuous EEG analysis. Patients underwent routine pre- anaesthetic evaluation and routine NPO protocols.

Results: Study population consisted of 100 ASA-PS I/II patients in the age group of 18- 60 years belonging to both sexes scheduled for elective general surgeries. After taking informed written consent, all the patients were taken up for the respective surgeries. On arrival to the operation theatre, Bispectral index electrode was applied on the patients forehead and connected to the multiparameter monitor and BIS values monitored throughout. Inj. glycopyrrolate 0.2mg I.V., Inj. Fentanyl 1 mcg/kg I.V. was administered.

Conclusion: Bispectral index is a simple, objective measure to assess depth of anaesthesia. There were predictable changes in BIS with the anesthesia technique in the present study. Similarly hemodynamic changes were also on the expected lines during the course of anesthesia.

Keywords: BIS, consciousness, & anaesthesia.

Study Design: Observational Study.

1. Introduction

Beginning in 1942, small doses of the muscle relaxant d-tubocurarine were used with the deep levels of ether anaesthesia that produced plane 2 or 3 of Guedel's stage III. Respiration was assisted when necessary. Over time, the dose of d-tubocurarine began to increase as fully controlled ventilation became commonplace[1]. Anaesthesiologists soon realized that they

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could combine controlled ventilation and large doses of muscle relaxants with low concentrations of inhaled anaesthetics to reduce the risk of toxicity (cardiovascular and respiratory depression) and increase the speed of emergence from anaesthesia. However, the use of muscle relaxants eliminated two valuable types of clinical signs of depth of anaesthesia: the rate and volume of respiration and the degree of muscle relaxation induced by the anaesthetic. Seven of the nine components of Guedel's classification system involved skeletal muscle activity[2]. When muscle relaxants are used with ether anaesthesia, only pupil size and lacrimation are left as clinical signs. These signs are inadequate to judge anaesthetic depth clinically. A 1945 editorial in the Lancet discussed the clinical problems that muscle relaxants would create, and descriptions of patient awareness during surgery later began to appear in the literature[3].

The electroencephalogram (EEG) is enjoying a renaissance of interest as a clinical monitoring tool during anaesthesia and sedation[4]. This revival is the result of two recent events: first, retargeting the use of EEG from confirming deep surgical anaesthesia to the assessment of lighter or sedative levels, and second, new technologic developments that have produced tangible progress in the creation of a monitor of "anaesthetic depth."

Bispectral analysis is a statistical technique that allows study of phenomena with nonlinear character, such as surf beats and wave breaking. Bispectral analysis provides a description to a continuous pseudo–randomly varying signal (e.g., EEG) that is an alternative to other conventional power spectral analysis techniques derived from fast Fourier transformation[5]. The first studies of EEG bispectral analysis were published in 1971. Bispectral analysis is computationally intensive, and it was not until fast microprocessors were developed that online bispectral analysis of the EEG in the operating room became possible[6].

2. Material and Methods

The study was carried out in 100 patients of ASA grade I& II scheduled for surgeries like laparotomy, hemithyroidectomy, cholecystectomy etc. The sample size is based on previous studies, the power of the study calculated on this sample size is more than 80%. The sample size is based on previous studies, the power of the study calculated on this sample size is more than 80%. During the above said study period, 100 patients posted for elective general surgeries under general anaesthesia underwent continuous EEG analysis. Patients underwent routine pre- anaesthetic evaluation and routine NPO protocols.

INCLUSION CRITERIA:

a) Patients belonging to ASA grade I & II.

b) Patients of either sex, aged 18 – 60 yrs, posted for elective surgical procedures expected to last at least one hour under general endotracheal anaesthesia.

EXCLUSION CRITERIA:

a) Patient refusal for the procedure.

b) ASA grade III & IV.

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3. Result

Table 1: Age distribution of patients in our study

Age in years	Number of patients	percentage
18-20	10	10.0
21-30	14	14.0
31-40	26	26.0
41-50	32	32
51-60	18	18
Total	100	100.0

Majority of the patients belonged to the age group of 20-50 years, 10 % between 18-20 years and 18% between 50 -60 years. Mean ± SD: 39.68±13.45

Table 2: Weight distribution in our study

Weight (kg)	Number of patients	%
31-40	08	8.0
41-50	48	48.0
51-60	24	24.0
61-70	18	18.0
>70	02	2.0
Total	100	100.0

Mean ± SD: 52.50±9.03

Table 3: Comparison of weight and BIS

BIS	WEIGHT IN KG		
	30-50	**51-60**	**>60**
Basal	97.36±1.97	97.75±0.97	96.8±1.55
Induction – 1 min	61.32±15.94	55.17±15.58	46.7±15.36
Induction -3 min	44.5±11.45	45.5±7.22	43.6±10.47
Intubation – 30 sec	53.18±14.29	52.25±8.16	50.5±11.91
Intubation - 1 min	55.39±11.4	55.75±7.93	53.3±11.51
Incision – 1 min	63.71±9.96	59.33±8.7	63.6±13.72
Incision - 3 min	64.32±8.06	58.33±9.98	63.3±14.16
Closure – 5 min	78.96±5.45	79.33±6.95	76.9±5.57
Extubation – 0 min	88.75±3.68	87.67±6.62	83.7±6.02
Extubation - 15 min	92.5±2.27	93.58±2.61	91.9±3.28

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Table 4: Showing variations in mean arterial blood pressure (Mean, S.D., p -value)

Time	Mean	S.D.	p - value
Basal	89.64	11.28	0.007
Induction – 3 min	77.90	13.90	
Intubation – 30 sec	101.50	20.71	
Intubation - 1 min	103.48	16.93	
Intubation - 3 min	96.90	18.08	
Incision – 1 min	94.92	19.24	
Incision - 3 min	96.04	18.61	
Incision - 5 min	97.66	16.19	
Closure – 5 min	103.42	15.66	
Extubation – 1 min	107.9	15.36	
Extubation -15 min	93.43	11.37	

4. Discussion

Kearse et al.[7], showed that a statistically significant difference was found between patients who mounted a hemodynamic response (BIS 67 ± 10) compared with those who did not (BIS 45 ± 14). In this study, power spectral edge and median frequency did not distinguish those subjects who responded from those who did not.

Smajic J et al. [8] conducted a study comparing PRST Score to bispectral index monitoring to assess the depth of anaesthesia and concluded that BIS monitoring is superior to PRST scoring in monitoring depth of anaesthesia. However, it is not a substitute for clinical assessment and hemodynamic monitoring. The use of BIS monitoring with clinical assessment allows precise decision making and balancing of anaesthesia.

Flaishon et al.[9], observed for thiopental, the heart rate at return of consciousness was significantly greater than that at 1 min before induction and at loss of consciousness. There were no other statistical differences in heart rate or blood pressure values in both propofol and thiopentone group at induction.

Guignard et al. [10], observed changes in BIS, MAP, and HR which were negatively correlated with remifentanil effect-site concentration ($P < 0.0001$). Hypotensive episodes (MAP < 60 mm Hg) were noted in 1, 2, and 5 patients in the remifentanil 4-, 8-, and 16-ng/mL groups, respectively. We conclude that the addition of remifentanil to propofol affects BIS only when a painful stimulus is applied. Moreover, remifentanil attenuated or abolished increases in BIS and MAP after tracheal intubation in a comparable dose dependent fashion.

5. Conclusion

Bispectral index is a simple, objective measure to assess depth of anaesthesia. There were predictable changes in BIS with the anesthesia technique in the present study. Similarly hemodynamic changes were also on the expected lines during the course of anesthesia.

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