Bilateral BIS compatible with Loss Of Response to Name Calling: Comparison between Patients with and without a Brain Tumour

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Introduction

The electroencephalogram during anaesthesia may be affected by brain tumour. We studied whether patients with unilateral or centrally located brain tumours have different BIS readings at Loss Of Response to Name Calling (LORNC) in healthy versus diseased hemispheres. We compared tumour patients with healthy control patients. We hypothesize that the presence of tumour evokes larger assymetry in bilateral BIS at LORNC compared to healthy control patients.

Methods

After EC approval and informed consent, 40 ASA 1 or 2 patients (**Control group**) and 41 patients with intracranial tumour (**Tumour group**) received a standardized anaesthesia while measuring bilateral BIS using BIS VISTA_{XP4} monitor and bilateral sensor (Covidien,Dublin,Ireland)(figure 1) All data was collected using RUGloop II. (Demed, Temse, Belgium) Remifentanyl was started at 3 or 5 ng/ml effect-site concentration (CE_{effect}) (Minto Model) and maintained throughout the study. Propofol was set at 2 µg/ml ($CE_{propofol}$) (Schnider model, fixed time to peak effect) and increased with incremental steps of 0.5 µg/ml. Every 15 seconds, the Observers' Assessment of Alertness and Sedation scale was determined until LORNC was observed. A t-test compared BIS compatible with LORNC between healthy versus diseased hemispheres within and between control and tumour patients. Statistical significance was set at $p < 0.05$.

Results

No demographic differences are found between groups. except for age. (table 1) Time to LORNC is significantly shorter in the tumour group (536s (± 162)) compared to control group (604s (± 148)). $CE_{propofol}$ at LORNC is significantly lower in the overall tumour group (2.89 µg/ml (± 0.8)) compared to control group (3.32 (± 0.86)). Patients with tumour located centrally in the brain or in the right hemisphere have higher BIS at LORNC compared to control patients or patients with tumour in the left hemisphere. (figure 2) No statistical significant BIS asymmetry is found between left and right BIS at LORNC in any group. (table 2)

Figure 2

Figure 1

Demographics	Age (years±SD)	Weight (kg±SD)	Height (cm±SD)	Time to LOC (sec ±SD)
Control group	46 ± 1 *	76 ± 15	171 ± 10	604 ± 148
Tumour group	50 ± 16 *	74 ± 15	172 ± 10	536 ± 162

* $p < 0.05$

Table 1

LORNC	BIS left (mean ±SD)	BIS right (mean±SD)
Control group	71 ± 9	71 ± 11
Left Tumour group	65 ± 14	64 ± 14
Right Tumour group	75 ± 9	75 ± 11
Central Tumour group	79 ± 10	74 ± 13

Table 2

Conclusions

No difference is found in BIS assymetry between individuals with or without brain tumour. In both groups, unilateral BIS monitoring is equally effective for detecting LORNC, compared to bilateral BIS. The higher BIS values at LORNC in some tumour patients are mainly attributable to differences in $CE_{propofol}$ at LORNC rather than to tumour related causes.