

The IoC during propofol induction.

Erik Weber Jensen
PhD in Medicine, MSc in Engineering

When a patient is induced with a bolus of propofol, then the patient is likely to reach quite a deep level of anaesthesia for a period of 5-20 min after the bolus induction.

This can be observed in the EEG as a Burst Suppression pattern, measured by the EEG suppression rate (ESR) on the IoC-view monitor. A bolus of 2 mg/kg propofol injected rapidly (5 s) gives a high effect site concentration, hence a low index is expected. In the article by Blum et al (see appendix), it was shown that another neuromonitor, the Bis reached minimum values of (mean (SD)) 28.7 (SD), the lowest values were around 10.

An example is shown in figure 1

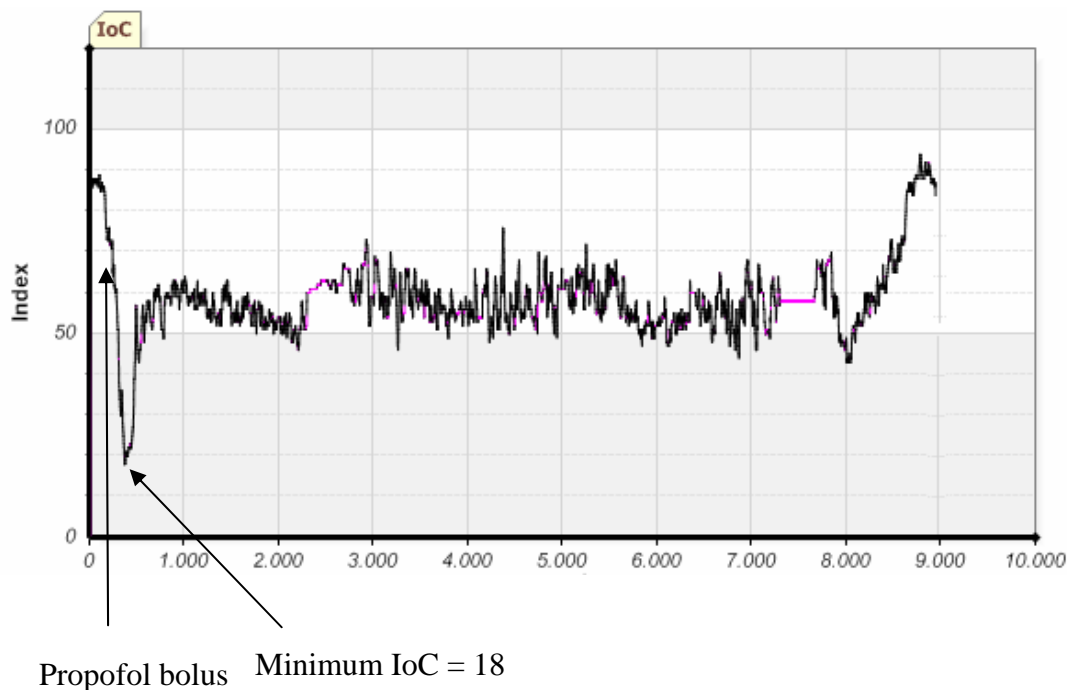


Figure 1. Example of IoC behaviour during general anaesthesia. The patient was induced with 2 mg/kg.

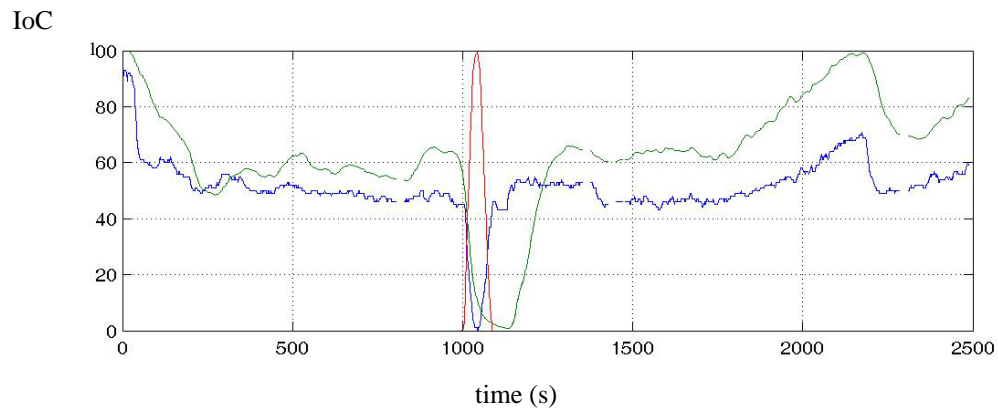


Figure 2. This an example of a paediatric patient (10 y) who erroneously received an extra bolus of propofol in the middle of the operation. This is caused a very low value of the IoC and a correspondingly high value of the ESR.

Conclusion

Induction with propofol can result in very low IoC values, easily down to 10, and in the worst case down to 0 for a short period, as shown in figure 2. This is common for other neuromonitors as well, see the appendix.

The IoC is also an educational tool because it visualizes the drug effect. The IoC can show that the depth of anaesthesia is more fluctuating if the anaesthetics is given as boluses with a syringe as compared with a TCI syringe pump.

Appendix

The Influence of Injection Rate on the Hypnotic Effect of Propofol during Anesthesia: A Randomized Trial

Jasmin Blum, Eberhard Kochs, Nicole Forster, and Gerhard Schneider*

Department of Anesthesiology, Technische Universität München, Klinikum rechts der Isar, Munich, Germany

* To whom correspondence should be addressed. E-mail:

Abstract

Objective: Previous studies suggested that slow injection of propofol may increase the hypnotic effect during induction of anesthesia. The aim of the present study was therefore to investigate whether injection rate of propofol has an influence on its maximum effect.

Design: Randomized, single-blind trial.

Setting: This study has been carried out in the operating rooms of a university hospital. An anesthesiologist and a resident performed the study with the aid of changing nursing staff.

Participants: We investigated 99 unpremedicated patients aged 18 to 60 years with American Society of Anesthesiologists (ASA) physical status 1–3.

Interventions: Anesthesia was induced by intravenous injection of propofol (2 mg/kg). Propofol was manually injected in group 1 over a period of 5 s; in group 2 (120-s injection interval), and in group 3 (240-s injection interval), propofol was administered by an injection pump. After loss of consciousness, mask ventilation was performed with 100% oxygen. Bispectral index (BIS) was used to measure the hypnotic effect of propofol. After the decrease of BIS to the minimum value (i.e., maximum hypnotic effect) and the following increase of BIS to 60, the study period was finished and anesthesia was performed according to clinical criteria.

Outcome Measures: We analyzed whether injection speed has an influence on the maximum hypnotic effect of a given dose of propofol (2 mg/kg).

Results: BIS_{min} marks the maximum electroencephalogram (EEG) effect of the propofol bolus as measured by the BIS. The lowest mean BIS_{min} was measured in group 1 (28.7 ± 10.3). In group 2, BIS_{min} was $33.0 (\pm 13.9)$, and in group 3, BIS_{min} was $36.4 (\pm 11.0)$. There were no significant differences between group 2 and groups 1 or 3, but there were significant differences between groups 1 and 3. In group 1, BIS_{min} was reached after $102.91 \text{ s} (\pm 44.20)$, in group 2 after $172.33 \text{ s} (\pm 29.76)$, and in group 3 after $274.21 \text{ s} (\pm 45.40)$. These differences were statistically significant for all comparisons. In summary, the lowest value for BIS_{min} was achieved in the group with the fastest rate of propofol injection (group 1, 5 s). The highest BIS_{min} was obtained in the group with the slowest rate of injection (group 3, 240 s). The hemodynamic parameters were not significantly different among groups.

Conclusions: The hypnotic peak effect of propofol is lower with extremely slow injection (240 s versus 5 s). For clinically usual injection rates (5 s and 120 s), there was no significant difference in propofol peak effect.

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