Closed-loop Anesthesia with Concert-CL® Syringe Pumps Station and Antinociception Titration by Pupillometry

Introduction: A closed-loop delivery of anesthetic drugs may help to limit inter and intra individual variability which still remain despite rather good performances of PK/PD population models used in Target Controlled Infusion (TCI) systems (1). Analgesic component is very important for the stability of Bispectral Index of the EEG (BIS®, Covidien™) during balanced anesthesia. Concert-CL® (Veryark™, Nanning, China) is a new, CE-marked, syringe pumps workstation, designed for closed-loop (on the BIS®) delivery of propofol, in order to maintain BIS values between 40 and 60 as recommended for general anesthesia. Remifentanil infusion is not delivered in closed-loop mode with this device, therefore it makes sense to optimize the target effect site concentration of the analgesics when using this device. A pupillometer, for an evaluation of the level of anti-nociception, may be useful in this situation. The performances of the device were studied under these conditions.

Materials and methods: This study received an IRB approval and we bring here preliminary results. It is a prospective, open, non-randomized study, on the records of patients undergoing anesthesia using Concert-CL ® with closed-loop on the BIS ® delivery of propofol and remifentanil TCI. Patients, scheduled for surgical interventions lasting more than 1 hour, gave their informed consent. The data come from anesthesia records and internal memory of the device for each patient : mean value of BIS , the percentage of BIS® value between 40 and 60 (% of BIS40 -60) , the median error absolute performance of the BIS® (MDAPE), the wobble or oscillation of BIS reflecting individual variability within the BIS® , the global score (GS) system defined by the equation : GS = (MDAPE wobble +) /% of BIS®40 -60 and the average concentrations of propofol and remifentanil are provided . The level of antinociception was assessed with a pupilometer (Algiscan® , IdMed™, Marseille France) and a pupillary pain index(PPI) less than 2 was reached for all the patients by adjustment of remifentanil target effect site concentration according to the PPI in response to a calibrated noxious stimulation, performed before the skin incision. This concentration was then maintained during the intervention.

Results: Data are presented as mean±SD for the 18 patients included (11 men and 7 females) : age =62±11 years, body mass index = 24±3.2, mean concentration of propofol= 2.4±0.5µg/mL, and remifentanil=3.2±0.7ng/mL. Performances parameters of Concert-CL are presented in table I:

Tableau I

% of BIS® 40-60	Mean BIS®	MDAPE	Wobble	GS
80.5±4.7	44.3±0.9	13.26±2	6.2±1.2	24.4±3.6

P<0,0001

Discussions: In this study,the GS of Concert-CL for closed-loop administration of propofol is similar to the GS of other experimental closed-loop delivery systems of propofol (2). Pupillometry provides a smart way to manage the antinociception in this context.

References : 1 - Anesth Analg. 2013 ; 117 : 1130-8

2 – Anesth Analg. 2011 ; 112 : 546-57