EFFECT OF CARDIOPULMONARY BYPASS (CPB) AND DEEP HYPOTHERMIC CIRCULATORY ARREST (DHCA) ON PROPOFOL PHARMACOKINETICS

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Introduction: Previous studies have reported that propofol plasma concentration decreases during CPB due to haemodilution, absorption, hypothermia, modified metabolism and changes in the ratio free/bound drug [1]. There is no information about propofol pharmacokinetics during deep hypothermia. We designed a prospective observational study to assess the changes in propofol plasma concentrations in patients undergoing pulmonary endarterectomy (PEA).

Methods: Following Research Ethics Committee approval, blood samples were collected in 10 adult patients undergoing PEA. Anaesthetic and surgical techniques were strictly standardised [2]. Propofol infusion was started on anaesthetic induction and continued unchanged throughout the operation. Samples were processed with the Pelorus 1500, a new in vitro diagnostic point-of-care medical device that had showed excellent agreement with HPLC for clinical samples [3]. Values are median and interquartile rank. Statistical significance was assessed with SPSS 20.0

Results: Patients were 63 (51-75) years old. Propofol infusion was set at 4 (3.3-4.4) mg.kg\(^{-1}\).h\(^{-1}\) and started 50 (42-54) minutes before the first sample was obtained. CPB time was 323 (266-774) minutes and total DHCA at 20ºC was 38 (35-41) minutes. A significant increase of the propofol plasma concentration was observed while the core temperature decreased (between DHCA: 6.46 (5.32-7.66) μg.mL\(^{-1}\), P=0.005). Propofol concentrations after CPB (3.84 (3.13-4.27) μg.mL\(^{-1}\)) were significantly lower than during DHCA (P=0.005) but significantly higher than before CPB (1.94 (1.61-2.19) μg.mL\(^{-1}\)) (P=0.007).

Discussion: In this study, the plasma concentration of propofol increased as temperature decreased. This differs from previous studies in normothermic and hypothermic CPB [1]. Metabolic slowing has been suggested in patients undergoing
hypothermic CPB with little impact in the plasma concentration but the effect of CPB may be different in normothermia, hypothermia and deep hypothermia.

References: