

The Link Between Baroreflex Function and Cerebral Autoregulation in Cardiac Surgery Patients Before and After Propofol Anesthesia Induction

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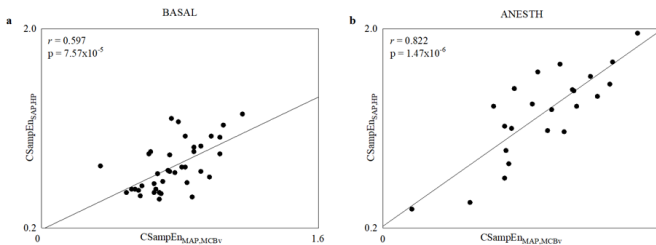
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Baroreflex (BR) and cerebral autoregulation (CA) are physiological mechanisms involved in arterial pressure (AP) regulation and cerebral blood flow maintenance, respectively. Prior studies have demonstrated that BR and CA maintain a reciprocal and compensatory relationship both in health and pathology in order to maintain stable cerebral perfusion. This is especially crucial during cardiac surgery after general anesthesia induction, as hypoperfusion is linked to an increased postoperative adverse event risk.

To this end, we assessed the relationship between BR and CA via an information-domain approach grounded on the calculation of cross-sample entropy (CSampEn). Electrocardiogram, AP, and cerebral blood velocity (CBv) signals were recorded in 46 patients undergoing major cardiac surgery, at baseline (BASAL) and after induction of propofol general anesthesia (ANESTH). CSampEn was computed between systolic AP (SAP) and heart period (HP) to assess BR, and between mean AP (MAP) and mean CBv (MCBv) to evaluate CA. Both markers increased during ANESTH, indicating reduced BR and enhanced CA. A significant positive linear correlation was observed between the two indices in BASAL ($r=0.597$, $p=7.57\times10^{-5}$) and in ANESTH ($r=0.822$, $p=1.47\times10^{-6}$). These findings confirm the presence of an association between BR and CA when assessed by a nonlinear, non-directional marker during cardiac surgery, whereby reduced BR function is compensated by enhanced CA and *vice versa*. Additionally, these results point toward a preservation of this link following propofol-based general anesthesia despite a depression in BR.



Scatterplots of CSampEn_{SAP,HP} and CSampEn_{MAP,MCBv} in BASAL (a) and during ANESTH (b).