

Influence of Autonomic Nervous System Activity on Cerebral Autoregulation in Traumatic Brain Injury

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Cerebral autoregulation (CAR) describes the ability of the cerebral vascular bed to maintain stable blood flow in the brain autonomously. This independently functioning process can be influenced by the autonomic nervous system (ANS). Traumatic brain injury (TBI) can lead to ANS dysfunction and destroy CAR functionality. Therefore, we assume that the functioning of CAR in TBI patients can be measured differently depending on the state of ANS activity. For this purpose, we analyzed CAR in invasive intracranial (ICP) and arterial blood pressure recordings from 19 TBI patients. CAR parameters were calculated as correlation coefficients of diastolic blood pressure with ICP diastolic value, beat amplitude and beat area. The correlation of heart rate (HR) and RMSSD with CAR parameters was calculated to assess ANS influence on CAR. Our results show a moderate correlation of HR with CAR parameters based on ICP beat area ($r = 0.59$, $p < 0.01$) and ICP beat amplitude ($r = 0.53$, $p < 0.05$). No significant correlation was found between RMSSD and CAR parameters. These results support that ANS activity affects CAR. In particular, it suggests that the sympathetic nervous system is more important than the parasympathetic nervous system in this process.