Association between Cerebral Autoregulation (CA) index, Pressure Reactivity (PRx) and quality of ABP(t) and ICP(t) signals for CA monitoring

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The pressure reactivity index (PRx) is valuable for monitoring traumatic patients. However, the quality of data for calculating PRx is questionable. Therefore, we explored the association between PRx and the quality of ABP(t) and ICP(t) signals using obvious moving average and FIR optimal filters. Data from 60 traumatic brain injury patients were collected. Moving average and FIR filtering was performed on the ABP(t) and ICP(t) signal, along with a "surrogate gold standard" as a reference. Receiver-operating characteristic (ROC) curves and areas under the curves (AUCs) were determined. A Bland–Altman assessment was also used to compare the methods. The FIR approach had 76.9% sensitivity, 77.8% specificity and an AUC of 0.812, which indicate excellent classification. The moving average method had 75% sensitivity and 60% specificity with AUC of 0.617. The Bland–Altman assessment showed lower and upper limits of agreement of -1.64 and 1.13, respectively and the mean bias ± SD was -0.25. The moving average had a significance level of 0.0006 and FIR-filtered PRx data had a significance level < 0.0001. The FIR (optimal) filtering approach is more sensitive to discriminate intact and impaired thresholds of PRx for TBI treatment decision making.