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Cephalic versus digital plethysmographic variability index measurement: a comparative pilot study in cardiac surgery patients.

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OBJECTIVES: Noninvasive measurement of digital plethysmographic variability index (PVI_{digital}) has been proposed to predict fluid responsiveness, with conflicting results. The authors tested the hypothesis that cephalic sites of PVI measurement (namely PVI_{lear} and PVI_{forehead}) could be more discriminant than PVI_{digital} to predict fluid responsiveness after cardiac surgery.

DESIGN: A prospective observational study.

SETTING: A cardiac surgical intensive care unit of a university hospital.

PARTICIPANTS: Fifty adult patients.

INTERVENTIONS: Investigation before and after fluid challenge.

MEASUREMENT AND MAIN RESULTS: Patients were prospectively included within the first 6-hour postoperative period and investigated before and after fluid challenge. A positive response to fluid challenge was defined as a 15% increase in cardiac index. PVI_{digital}, PVI_{lear}, PVI_{forehead}, and invasive arterial pulse-pressure variation (PPV) measurements were recorded simultaneously, and receiver operating characteristic (ROC) curves were built. Forty-one (82%) patients were responders and 9 (18%) patients were nonresponders to fluid challenge. ROCAUC were 0.74 (95% confidence interval [95% CI]: 0.60-0.86), 0.81 (95% CI: 0.68-0.91), 0.88 (95% CI: 0.75-0.95) and 0.87 (95% CI: 0.75-0.95) for PVI_{digital}, PVI_{lear}, PVI_{forehead}, and PPV, respectively. Significant differences were observed between PVI_{forehead} and PVI_{digital} (absolute difference in ROCAUC = 0.134 [95% CI: 0.003-0.265], $p = 0.045$) and between PPV and PVI_{digital} (absolute difference in ROCAUC = 0.129 [95% CI: 0.011-0.247], $p = 0.033$). The percentage of patients within the inconclusive class of response was 46%, 70%, 44%, and 26% for PVI_{digital}, PVI_{lear}, PVI_{forehead}, and PPV, respectively.

CONCLUSIONS: PVI_{forehead} was more discriminant than PVI_{digital} and could be a valuable alternative to arterial PPV in predicting fluid responsiveness.