Category :**Cardiovascular: Other**

A115 - ***Phenotyping intraoperative hypotension using artificial intelligence in patients having major abdominal surgery***

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Introduction:

Intraoperative hypotension is associated with postoperative myocardial injury, acute kidney injury, and death and thus should be avoided. In clinical practice, specific causes of intraoperative hypotension are often neglected. A detailed understanding of underlying hemodynamic alterations would allow treating intraoperative hypotension causally. We sought to use artificial intelligence to identify intraoperative hypotension phenotypes characterized by different underlying hemodynamic alterations in major abdominal surgery patients. We hypothesized that artificial intelligence can identify intraoperative hypotension phenotypes.

Methods:

We conducted a secondary analysis of intraoperative hemodynamic measurements from a prospective observational study in 100 patients who had major abdominal surgery with general anesthesia including stroke volume index, heart rate, cardiac index, systemic vascular resistance index, and pulse pressure variation measurements. We defined intraoperative hypotension as mean arterial pressure (MAP) ≤65 mmHg or MAP between 66 and 75 mmHg when the norepinephrine infusion rate exceeded 0.1 µg/kg/min. To identify intraoperative hypotension phenotypes we used an artificial intelligence algorithm – specifically, hierarchical clustering and then applied the algorithm to pairwise Euclidean distances using Ward's minimum variance method.

Results:

There were 615 episodes of intraoperative hypotension in 82 patients. Artificial intelligence revealed six as the optimal number of intraoperative hypotension phenotypes. Based on their clinical characteristics, we labeled the phenotypes as 1) *myocardial depression*, 2) *bradycardia*, 3) *vasodilation with CI increase*, 4) *vasodilation without CI increase*, 5) *hypovolemia*, and 6) *mixed type* (Figure 1).

Conclusion:

Artificial intelligence identified six intraoperative hypotension phenotypes. Considering these phenotypes may allow treating intraoperative hypotension causally with specific therapeutic interventions.

Image :

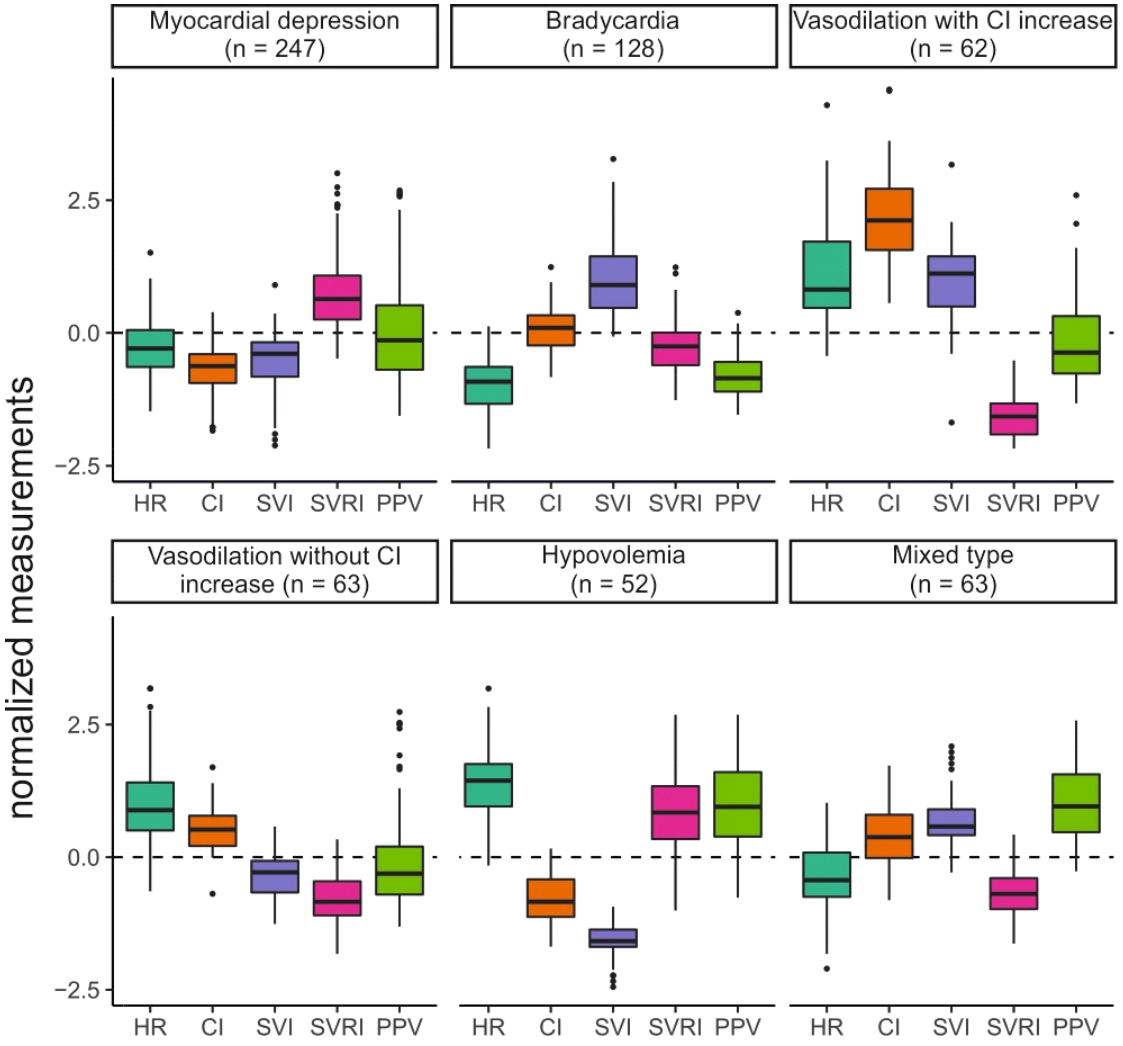

Figure 1: Boxplots showing the normalized mean and standard deviation of stroke volume index (SVI), heart rate (HR), cardiac index (CI), systemic vascular resistance index (SVRI), and pulse pressure variation (PPV) for each phenotype. Data are normalized to a mean of zero (dashed horizontal line) and a standard deviation of one. Boxes represent 25th and 75th percentiles and the range between them is the interquartile range. Inside the boxes, bold horizontal lines represent medians. The whiskers (extensions from the box) indicate the lowest and highest value no further than 1.5 times the interquartile range. Outliers are shown as dots.