271 AUTOMATED REAL TIME ECHOCARDIOGRAPHIC TOOL FOR EDGE TRACKING OF INFERIOR VENA CAVA AND NON-INVASIVE ESTIMATION OF RIGHT ATRIAL PRESSURE

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Automated Real Time Echocardiographic Tool for Edge-Tracking of Inferior Vena Cava and Non-invasive Estimation of Right Atrial Pressure

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The non-invasive estimation of right atrial pressure (RAP) would be a key advancement in several clinical scenarios, in which the knowledge of central venous filling pressure is vital for patients' management. The echocardiographic estimation of RAP proposed by Guidelines, based on inferior vena cava (IVC) size and respirophasic collapsibility, is exposed to operator and patient dependent variability.
We introduce an automated real time method to process ultrasound scans of IVC and to measure pulsatility indexes, which are then used, together with other non-invasive measurements, to estimate RAP. Specifically, our method is based on the cardiac collapsibility (cardiac caval index - CCI), tested in a monocentric retrospective cohort of patients undergoing echocardiography and right heart catheterization (RHC) within 24 hour in condition of clinical and therapeutic stability (170 patients, age 64±14, male 45%, with pulmonary arterial hypertension, heart failure, valvular heart disease, dyspnea or other pathologies). IVC size and CCI were integrated with other standard echocardiographic features using machine-learning approaches. Three RAP classes (low <5 mmHg, intermediate 5-10 mmHg and high >10 mmHg) were generated and RHC values used as comparator.
Our classifications showed a higher accuracy than Guidelines (71% and 61% for our machine-learning method and Guidelines, respectively), promoting the integration of IVC and echocardiographic features for an improved non-invasive estimation of RAP.