Cleveland Clinic Innovations

PRODUCT
Comprehensive Right Ventricle Function Monitoring

INDICATION
Cardiology, hemodynamic monitoring, RV dysfunction

VALUE PROPOSITION
- Continuous monitoring of RV function
- Early detection of RV dysfunction reducing multi-organ failure and risk of death

DEVELOPMENT STAGE
Workflow and landmarks identified from current setup.

INTELLECTUAL PROPERTY
Patent pending

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Continuous Right Ventricular Hemodynamic Monitoring

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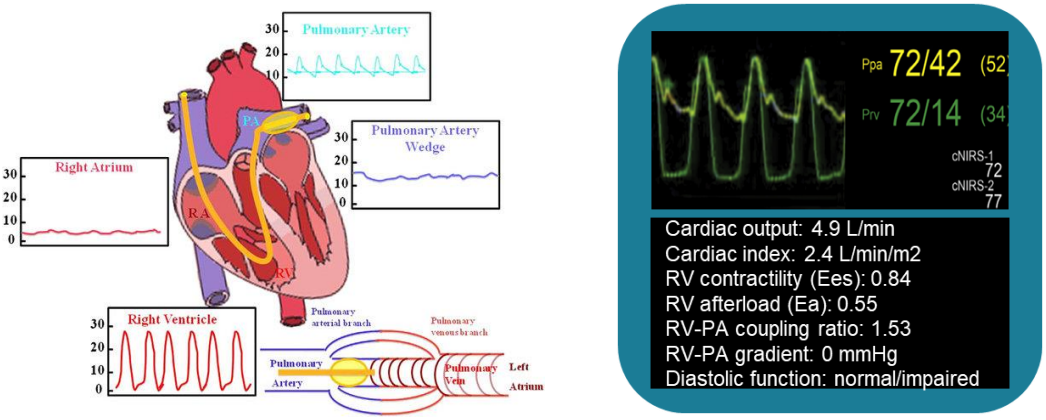
UNMET NEED

Right ventricular (RV) dysfunction refers to a condition in which the right ventricle of the heart has impaired ability to pump blood effectively, resulting in a variety of symptoms and complications. RV dysfunction complicates many disease states in critical care and perioperative medicine, increasing the risk of mortality by 50%. Unfortunately, RV dysfunction goes unrecognized due to difficulty in detection and lack of real-time monitoring technologies. The gold standard method to characterize RV function is via invasive pressure-volume loop catheterization which is associated with high cost and requires advanced expertise to place the catheter and interpret the data. Currently available hemodynamic monitoring tools are inadequate to characterize and monitor RV dysfunction in at-risk patient populations.

SOLUTION

This invention is a hemodynamic monitoring console which connects to a PA catheter with an RV pressure port to algorithmically derive key variables for the treatment of RV dysfunction. The invention utilizes the commonly used method of RV function monitoring via pulmonary artery catheterization and provide information on pulmonary, central venous, and pulmonary capillary wedge pressures, and cardiac output. The monitoring system will provide continuous, dynamic information about ventricular function and cardiac output. In addition, it would provide information on right ventricular-pulmonary arterial (RV-PA) coupling. RV-PA coupling is the energetic relationship of the RV to the pulmonary circulation, incorporating information about the ventricular contractility as well as the pulmonary afterload. The console would continuously report:

- Cardiac output and stroke volume
- RV contractility (end systolic elastance, Ees)
- PA afterload (effective arterial elastance, Ea)
- RV-PA coupling ratio (Ees/Ea)
- RV-PA gradient (to detect RV outflow tract obstruction)
- RV diastolic dysfunction



A pulmonary artery catheter with RV pressure monitoring port (left) and a console-based monitoring system (right)