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Shape-based analysis of right ventricular dysfunction associated with acute pulmonary embolism

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Invention Description

Acute pulmonary embolism (APE) is the third most common cause of death in the US with at least 600,000 cases occurring annually. APE results from migration of emboli to the lungs and obstruction of pulmonary blood vessels. If detected in early stages of development, the high rate of mortality caused by APE may be reduced significantly. A better understanding of the biomechanics of the cardiac right ventricle (RV) and the contribution of APE to RV dysfunction may provide insight into biomarker identification and subsequent early diagnosis of APE.

Researchers at Arizona State University have developed a method of detecting early stage APE using measured biomechanical changes to the cardiac right ventricle. It was found that RV dysfunction due to APE exhibits several characteristic signs including (1) waving paradoxical motion of the RV inner boundary, (2) decrease in local curvature of the septum, (3) lower positive correlation between the movement of inner boundaries of the septal and free walls of the RV, (4) slower blood ejection by the RV, and (5) discontinuous movement observed particularly in the middle of the RV septal wall.

Using these characteristic features, early stage APE can be diagnosed and prognosis of APE can be more accurately determined.

Potential Applications

- Early stage detection of APE
- Determination of APE prognosis

Benefits and Advantages

- Early detection increases chance or survival
- Plurality of functional biomarkers for better diagnostic ability
- Development of effective methods for detecting and visualizing abnormal RV characteristics