

Automatic detection of the end-diastolic and end-systolic from 4D echocardiographic images

ABSTRACT

Accurate detection of the End-Diastolic (ED) and End-Systolic (ES) frames of a cardiac cycle are significant factors that may affect the accuracy of abnormality assessment of a ventricle. This process is a routine step of the ventricle assessment procedure as most of the time in clinical reports many parameters are measured in these two frames to help in diagnosing and dissection making. According to the previous works the process of detecting the ED and ES remains a challenge in that the ED and ES frames for the cavity are usually determined manually by review of individual image phases of the cavity and/or tracking the tricuspid valve. The proposed algorithm aims to automatically determine the ED and ES frames from the four Dimensional Echocardiographic images (4DE) of the Right Ventricle (RV) from one cardiac cycle. By computing the area of three slices along one cardiac cycle and selecting the maximum area as the ED frame and the minimum area as the ES frame. This method gives an accurate determination for the ED and ES frames, hence avoid the need for time consuming, expert contributions during the process of computing the cavity stroke volume.

Keyword: End-diastolic (ED) and end-systolic (ES); Echocardiography image; Stroke volume; Right ventricle (RV); Left ventricle (LV); Three dimensional echocardiography (3DE); Proposed method; QLAB system; Automatic algorithm; Wall motion