Measurements of mitral annular displacement in 2D echocardiography images

ABSTRACT

Mitral Annular Displacement (MAD) in echocardiography has been described as a variation in mitral annulus position between the enddiastolic and the end-systolic in a complete cardiac cycle. It could be used as a rapid and reproducible method of determining the LV global systolic function and could be an easily detectable index for wall motion abnormalities. In this study, a computational method of MAD was implemented based on the mitral annulus motion tracking at both sides; namely the lateral side and the septal side using 2D-Echocardiographic (2DE) datasets. This method comprises three main processing stages: 2DE dataset preparation, Region Of Interest (ROI) selection and MAD measurements. For each 2DE dataset, MAD was computed as the movement distance toward the LV apex at both sides individually in twoconsecutive frames using the ‘Euclidian distance' method. Then, the maximum displacement occurs during a complete cardiac cycle was measured in millimetres (mm) for each side. The overall datasets used are 178 original 2D-echocardiography images in 4-chamber view. The experimental results for MAD measurements were compared with results that obtained by TMQ Advanced technique using QLAB software. The comparative analysis was done qualitatively by visual observation of two expert and the comparison scores show that the proposed method of MAD measurements has high acceptability of 85%. Furthermore, the quantitative analysis of the MAD method is comparable with TMAD measurements by QLAB and there is no significant differences in displacement measurements.

Keyword: LV systolic function; Displacement measurements; QLAB software; Statistical analysis; Mitral annulus