The role of preoperative three-dimensional transthoracic echocardiography in a heart failure patient with a left ventricular aneurysm

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Background: Assessment of left ventricular (LV) geometry and function represents the most frequent indication for an echocardiographic study in patient evaluation, management and indication for cardiac surgery.^{1,2} Three-dimensional transthoracic echocardiography (3DTTE) has been shown to be more accurate for quantification of LV volumes, compared to conventional two-dimensional (2D) echocardiography and real time 3DTTE is only imaging technique based on volumetric scanning able to show moving structures in the beating heart.³ Magnetic resonance imaging (MRI) is currently considered the gold standard^{2,3} but is not widely available and feasible in some patients. Surgical ventricular reconstruction (SVR) is a treatment option in heart failure patients with left ventricular (LV)

aneurysm. Endoventricular circular patch plasty (Dor procedure) has been proposed as a treatment for heart failure patients with an extensive myocardial infarction and LV aneurysm.⁴ However, accurate patient selection should be performed to set the indication for SVR to determine LV size and shape and to avoid an excessive volume reduction and cavity deformation that can lead to progressive diastolic dysfunction and to a restrictive filling pattern.

FIGURE 1. From the same pyramidal three-dimensional data set, the left ventricle can be visualized using different display modalities: multislice (multiple two-dimensional tomographic views extracted automatically from a single 3D data set) (A) with the addition of a contrast agent (B). Surface rendering display of left ventricle volume in the same patient (C). Volume rendering of mitral valve in the same patient (D).

Case report: We present a patient with ischemic cardiomyopathy and LV aneurysm who underwent Dor procedure, and was preoperatively assessed by real time 3DTTE combined with contrast echocardiography to assess LV, mitral valve function and presence of LV thrombus (**Figure 1**). Decision point for aneurysmectomy is often finding of LV thrombus. Contrast echocardiography can be used to determine the presence of thrombus using left ventricle opacification method or detecting myocardial perfusion (**Figure 1**). SVR is often accompanied by mitral valve repair, therefore severity of mitral regurgitation should be carefully evaluated.⁵ Significant shortcoming of 3DTTE is the electrocardiographic gating necessary to obtain full volume images and difficulty to acquire images in patients with atrial fibrillation which is often present in these patients.

Conclusion: 3DTTE provides a comprehensive assessment in the management of heart failure patients with LV aneurysm which is crucial for their clinical management.

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