Introduction

Real-time 3-dimensional echocardiography (RT3DE) has been in continuous development for approximately 10 years. Advances in the acquisition, storage and analysis of RT3DE images have made its use increasingly common in echocardiography laboratories, not only for research purposes but also in daily clinical practice. Many three-dimensional echocardiographic (3DE) studies focus on the analysis of the mitral valve (MV). 3DE has enabled us to understand the functional anatomy of the MV, the pathophysiology of MV disease, and especially that of functional mitral regurgitation (FMR). ***(Solís et al. 2009)***

Ischemic mitral regurgitation (IMR) is the regurgitation seen with structurally normal valve leaflets that occurs secondarily to myocardial infarction or in the presence of acute ischemia. It occurs in approximately (20%) of patients after myocardial infarction and (56%) of patients with congestive heart failure caused by ischemic or nonischemic cardiomyopathy. ***(Huong et al. 2006)***

IMR is a disease state that differs from ischemic cardiomyopathy with mitral regurgitation secondary to degenerative mitral valve disease, rheumatic disease, or endocarditis. ***(Huong et al. 2006)***

IMR often termed *functional mitral regurgitation*. ***(Gillinov et al. 2001), (Grossi et al. 2001)***

Functional ischemic mitral regurgitation (MR) is now receiving increased attention as one of the last frontiers in mitral valve repair as well as a therapeutic opportunity in heart failure. ***(Grigioni et al. 2001), (John et al. 2002)***

Valve repair has proved more challenging for ischemic MR than for degenerative mitral valve prolapse, in which surgery is tailored to the detailed anatomy displayed by echocardiography and inspection. Successful valve repair must target the mechanism of dysfunction in the individual patient; to date, however, both understanding of mechanism and targeting of therapy have been elusive for ischemic MR. ***(Cohn et al. 1995), (Gillinov et al. 2001)***

Ischemic mitral regurgitation has remained a therapeutic challenge. ***(Cohn et al. 1995), (Grossi et al. 2001)***, with important failure and recurrence rates after standard annular ring reduction. ***(Calafiore et al. 2001), (Tahta et al. 2002)*** and a higher peri-operative mortality than with degenerative MR. ***(Grossi et al. 2001)***

Published clinical guidelines recommend use of a synthesis of several two-dimensional (2D) Doppler, color Doppler and spectral Doppler parameters to grade MR severity. ***(Zoghbi et al. 2003)***

In recent past, various studies have demonstrated the potential clinical applicability of newer generation real time 3D echocardiography with advances in technique for image acquisition and digital data processing in non-invasive evaluation of heart diseases. ***(Kisslo et al. 2000) , (Franke et al. 2003)***

Now, the clinical applications of 3D echocardiography are expanding and include the following:

1- 3D display of valvular lesions. ***(Xie et al. 2006)***
2- Quantitative measurement of ventricular volume and mass. ***(Caiani et al. 2005), (Mor-Avi et al. 2004)***
3- Simultaneous analysis of regional wall motion in multiple segments.
4- Evaluation of congenital heart disease.

5- Demonstration of the spatial relation between abnormal and normal cardiac structure.

6- 6- Determination of ventricular mechanical dyssynchrony. ***(Kapetanakis et al. 2005)***

Furthermore, real-time 3D echocardiography is the only on-line 3D method based on real time volumetric scanning, as compared with other 3D imaging techniques such as magnetic resonance imaging (MRI) and computed tomographies (CT), which are based on post-acquisition reconstruction and not on volumetric scanning. ***(Ravi et al. 2006)***