

Cardiac Imaging

Three Dimensional Trans-Esophageal Echocardiography for the Evaluation of Flail Mitral Valve

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Key words: **Flail chord, mitral regurgitation, real-time three-dimensional echocardiography.**

Manuscript received:
April 25, 2011;
Accepted:
July 20, 2011.

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A 26-year-old previously healthy female presented to a local emergency room complaining of cough, dyspnea on exertion, and mild fatigue noted over a period of a few weeks. Her physical examination was essentially unremarkable, with the exception of a IV/VI holosystolic murmur heard best at the apex and radiating to the axilla. Two-dimensional transthoracic echocardiography revealed severe mitral regurgitation and subsequent transesophageal echocardiography (TEE) was performed to further identify the etiology of the mitral regurgitation. 2D TEE confirmed the presence of severe mitral regurgitation (Figures 1 & 2). TEE views at different angles had to be obtained so as to identify the mechanism of mitral regurgitation. The suspicion of a torn *chorda* was raised (Figure 3). TEE with real-time 3D (RT3D) imaging clearly identified a torn *chorda* of the P2 scallop as the cause (Figures 4 & 5), showing its added value in recognizing mitral valve pathology.

Cardiothoracic surgery was consulted for surgical repair of the mitral valve, and the patient underwent successful repair

based on the 3D images. Mitral valve repair consisted of a complex reconstruction procedure, with excision of a portion of the P2 segment and inversion of another portion of the flail segment. Finally, annuloplasty was performed with a 28 mm annuloplasty ring. The pathology report of the surgical specimen described it as having myxomatous degeneration.

Myxomatous degeneration of the mitral valve is a frequent cause of *chordae tendineae* rupture and mitral regurgitation.¹ TEE with RT3D images has been used extensively in the evaluation of mitral regurgitation^{2,3} and can be useful in surgical judgment and planning, as seen in reports from several centers.⁴ Three-dimensional imaging allows for sections of the mitral valve to be viewed at any level and orientation and thus allows better identification of the origination of the *chordae*, as well as improved identification of the specific scallop involved. Thus, our RT3D images provided clear anatomical localization, revealed the pathological extent of this patient's valvular disease and assisted our surgical colleagues in this complicated valve repair.

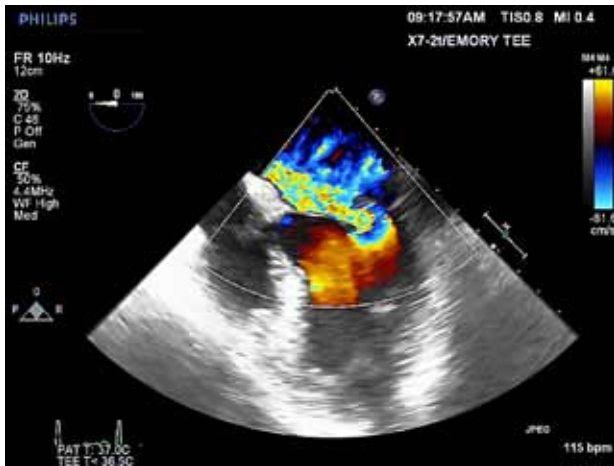


Figure 1. Transesophageal echocardiography, 4-chamber view with color Doppler, showing a large mitral regurgitation jet directed anteriorly.

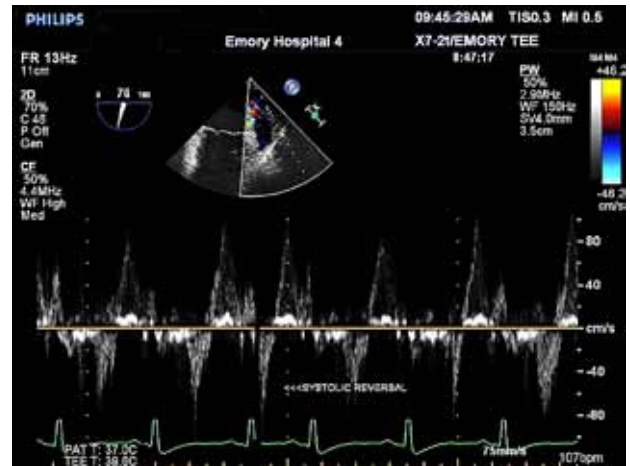


Figure 2. Transesophageal echocardiography, Doppler image showing systolic flow reversal in the left upper pulmonary vein.



Figure 3. Transesophageal echocardiography, 4-chamber image at 30° showing a possibly torn *chorda tendinea*.

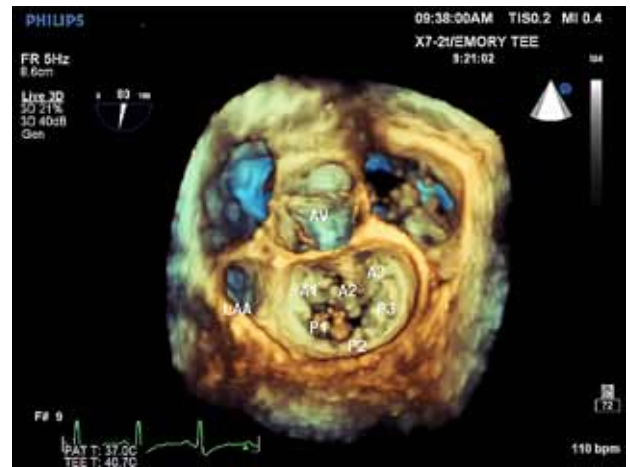


Figure 4. Surgeon's view of the mitral valve apparatus. AV – aortic valve; LAA – left atrial appendage; A1, A2, A3 represent divisions of the anterior leaflet into three anterior scallops; P1, P2, P3 represent division of the posterior leaflet into three posterior scallops.



Figure 5. Surgeon's view of the torn *chorda* from the P2 scallop. Abbreviations as in Figure 4.

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