Posterior Leaflet Motion in Mitral Stenosis*  

Stephen P. Glasser, M.D.,** and James V. Farkis, M.D.†

The echocardiographic features of mitral valvular motion in a patient with classic rheumatic mitral stenosis are presented. Two unusual features were noted, and the importance of careful echocardiographic scanning of the mitral valve is emphasized. The theories for the classic echocardiographic abnormalities of mitral stenosis are briefly considered in light of the findings in this case.

The classic criterion developed for the echocardiographic diagnosis of mitral stenosis has been the reduced rate of early diastolic mitral valvular closure (E-F slope).1 Subsequently, it was learned that conditions other than mitral stenosis resulted in a similar reduction in the rate of closure.2 In 1972, Duchak et al demonstrated that in true mitral stenosis the anterior and posterior mitral valvular leaflets moved in the same direction (concordantly) in diastole, whereas in those conditions other than mitral stenosis, the posterior mitral valve leaflet maintained its normal diastolic “mirror image” (discordant) motion. Recently, several reports of discordant mitral valve motion have been documented in cases of true mitral stenosis.4,5

Presented in this report is a case of documented severe and otherwise typical rheumatic mitral stenosis with several interesting echocardiographic features. First, both discordant and concordant motions of the posterior leaflet were noted from the same patient as the mitral valve was echocardiographically scanned. Second, the anterior leaflet motion was classic for mitral stenosis with no “a” wave (in spite of normal sinus rhythm), while the posterior leaflet demonstrated a clear “a” wave.

**Case Report**

A 30-year-old woman was referred for evaluation because of increasing dyspnea. She had undergone two mitral commissurotomies 12 and 10 years earlier and had done well until the preceding several months. Atrial biopsies taken at the time of her second commissurotomy demonstrated Aschoff’s bodies. Physical examination revealed the findings of pure mitral stenosis, and cardiac catheterization documented this clinical impression with a calculated mitral valvular area of 0.6 sq cm (Fig 1). Moderate mitral valve calcification was detected on fluoroscopic examination. Echocardiograms consistently demonstrated the features seen in Figure 2. Mitral valvular replacement was recommended, and at surgery a typical calcified mitral valve was removed. The cusps were thickened, commissural fusion was present, and shortened chordae tendineae were noted.

**Discussion**

Echocardiographic studies have been used extensively in the diagnosis and evaluation of mitral stenosis. The major echographic features are reduction in the E-F slope of the anterior leaflet and concordant motion of the anterior and posterior mitral leaflets. The importance of this finding is related to the knowledge that reductions in the E-F slope can be caused by conditions other than true mitral stenosis, such as hypertrophic cardiomyopathy, pulmonary hypertension, and others; however, Duchak et al demonstrated that in contrast to true mitral stenosis, these conditions were associated with discordant mitral leaflet motion. Although by no means obviating the importance of these features, several reports recently have documented mirror-image motion of the anterior and posterior mitral leaflets in true mitral stenosis.4,5

The reasons for reduced E-F slopes and for discordant mitral leaflet motion in patients with mitral stenosis remain unclear. A common theory is that the high left atrial pressure and the continuous pressure gradient...
Simultaneous recordings of left ventricular (LV) and pulmonary capillary wedge pressure (PCWP) demonstrate mitral valve gradient of 25 mm Hg.

across the valve keeps the valve leaflets in the full opened position throughout diastole. In addition, the common association of thickened, rigid cusps fused together at their commissures adds to this abnormal pattern of motion. The case reported herein is important in relation to these concepts. That the high left atrial pressure or pressure gradient is not solely responsible for this abnormal mitral valve motion is evident from the different leaflet motions recorded from our patient. The unexpected concordant mitral motion might be explained in part by an unequal degree of thickening and fibrosis of the two leaflets, the extent of commissural fusion, and involvement of chordae tendineae; however, at surgery, there was no apparent anatomic explanation. Also, this case emphasizes the importance of careful scanning of the mitral valve, since either discordant or concordant motion of the posterior leaflet could have been the sole finding in an incomplete study.

REFERENCES
1 Segal BL, Likoff W, Kingsley B: Echocardiography: Clinical application in mitral stenosis. JAMA 195:99-104, 1966

Figure 1. Scan from free edge of mitral valve toward base. Note mirror-image motion of mitral leaflets phasing into classic concordant motion of mitral stenosis. Also note presence of mitral valvular “a” wave from posterior mitral leaflet (PML) and its absence on anterior mitral leaflet (AML). Thickened band of echoes are consistent with documented mitral calcification.