Limitations of the Echocardiogram in Diagnosing Valvular Vegetations in Patients with Mitral Valve Prolapse

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SUMMARY In order to assess the reliability of the echocardiogram in detecting valvular vegetations in patients with mitral valve prolapse (MVP), echocardiograms from 85 consecutive patients with mitral valve prolapse were reviewed. Eleven patients had thick shaggy echoes confined to the anterior mitral leaflet; five patients had shaggy echoes on the posterior leaflet; and five had abnormal echoes on both the anterior and posterior leaflets. Only one patient had clinical evidence of infective endocarditis. Redundant leaflets which present multiple surfaces for the production of echoes may explain the abnormal echoes that were observed. Patients with echocardiographic features suggesting mild prolapse less commonly exhibited shaggy leaflet echoes than those with more severe prolapse. Because a significant proportion (40%) of patients with MVP had shaggy echoes which closely resembled those seen in valvular vegetations, we feel that the echocardiogram is of limited value in diagnosing infective endocarditis in patients with mitral valve prolapse.

RECENT STUDIES have indicated that mitral valve prolapse is a common entity.1,2 The role of echocardiography in diagnosing mitral valve prolapse is firmly established.3-6 Infective endocarditis of the mitral valve has been shown to produce shaggy echoes on the valve leaflets.7-10 Several reports have indicated the susceptibility of patients with mitral prolapse to infective endocarditis.11-13 Allen and co-workers followed 62 cases with late systolic murmurs over a mean period of 13.8 years, during which five patients developed bacterial endocarditis. Popp observed that 20 to 30% of patients with isolated mitral valve endocarditis have echocographic, angiocardiographic or pathologic evidence of prolapse.14 Since echocardiography is useful in the evaluation of mitral valve prolapse (MVP) and valvular vegetations, it should be of value in the diagnosis of infective endocarditis in patients with MVP. This paper points out the limitations of diagnostic ultrasound in the detection of valvular vegetations in subjects with MVP.

Materials and Methods

A retrospective analysis of the echocardiograms of 85 consecutive patients with mitral valve prolapse was performed. The group consisted of 46 females and 39 males whose ages ranged from nine to 78 years (mean 37 years). The patients were examined in the supine position with a 2.25 MHz, 0.5 inch, 10 cm focus transducer, an Ekoline 20 ultrasonoscope and a Honeywell 1856 recorder. The echocardiograms were performed from the interspace from which the mitral valve could be visualized by perpendicular or near perpendicular placement of the transducer. Care was taken to avoid false positive diagnosis of prolapse due to inferior angulation of the transducer.14 Optimal damping was used to obtain sharp echoes from the mitral leaflets. A sweep from the aortic root to the left ventricle was made in each instance. The extent of valve prolapse was determined by measuring the vertical distance from the point of maximal prolapse to the CD segment of the mitral valve.14 The echocardiograms were examined independently by two observers for the presence of thick shaggy echoes on the mitral valve leaflets in diastole. Multiple echoes noted only during systole were not considered abnormal. Multiple, discrete, linear echoes in diastole or mild thickening of the leaflets also were not construed as abnormal.

Results

All the patients had either the classical mid-systolic or holosystolic variety of mitral valve prolapse.14 Thirty-four patients were observed to have clearly abnormal diastolic echoes. Eleven patients had thick shaggy echoes limited to the anterior mitral leaflet; eighteen were noted to have shaggy echoes on the posterior mitral leaflet; and five patients had abnormal echoes on both leaflets. There was disagreement between the two observers in six cases; these records therefore were not considered abnormal. Mild mitral valve prolapse (< 5 mm) was observed in 38 patients, seven of whom (18%) had shaggy echoes on the leaflets.
Shaggy echoes are seen on the posterior leaflet. The mitral valve prolapse in this patient is not striking on this figure and is better illustrated in figure 4.

**Discussion**

Multiple echoes from the mitral leaflets may be seen in normal subjects, especially during systole. Similar linear, discrete echoes may be noted in diastole due to beam width artifact. Such echoes should not be construed as evidence of mitral valve pathology. Vegetations on the mitral valve produce shaggy echoes which may be more prominent in diastole. Occasional departures from this pattern may be observed: one patient with valvular vegetations reported by Dillon and coworkers had multiple linear echoes rather than shaggy echoes. Wann and associates indicated that abnormal echoes indistinguishable from those seen in infective endocarditis may be noted in patients with mitral valve prolapse. However, the incidence of such abnormalities in

**FIGURE 1.** Echocardiogram of a patient with mitral valve prolapse (vertical arrow) which demonstrates shaggy echoes on the posterior leaflet (PML). The linear echoes on the anterior mitral leaflet (AML) were not considered abnormal.

Forty-seven patients had MVP of 5 mm or greater of whom 27 (57%) had shaggy echoes on the valve.

Figure 1 shows an example of shaggy echoes on the posterior leaflet. Thickening of the anterior leaflet by shaggy echoes is noted on figure 2. The echocardiogram of the patient who had bacterial endocarditis is depicted in figure 3.

**FIGURE 2.** Ultrasound record illustrating abnormal thickening of the anterior mitral leaflet (AMV) by shaggy echoes. The vertical arrow shows mid systolic posterior motion of the valve. PMV = posterior mitral leaflet.

**FIGURE 3.** Echocardiogram of a patient who had bacterial endocarditis. Note the thick shaggy echoes on the posterior mitral leaflet (PMV).
patients with floppy mitral valves but no clinical evidence of endocarditis has not been documented previously. We noted that a sizable proportion (40%) of patients with mitral valve prolapse had thick shaggy echoes on the mitral leaflets which closely resembled those seen with valvular vegetations. With one exception, none of these patients had clinical evidence of infective endocarditis either on the initial examination or on subsequent follow-up visits. The abnormal echoes observed in this group were probably due to redundant leaflets which presented multiple surfaces for the production of echoes. Because of the frequent occurrence of such abnormalities we feel that the echocardiogram is of limited value in the diagnosis of mitral valve vegetations in patients with floppy mitral valves.

One of our patients had bacteriologically proven endocarditis. His ultrasound recording showed thick echoes on the mitral valve, which would have been very suggestive of mitral valve vegetations in the absence of valve prolapse. The echocardiogram performed twelve weeks after bacteriological cure showed no significant change in the abnormal echo pattern. Dillon and associates noted an increase in size and intensity of the echoes from vegetations in two of their patients, in spite of bacteriological cure. They attributed this to “a normal healing process.” Roy and coworkers also observed no change in the echo pattern in five patients after successful therapy of endocarditis. The echocardiographic pattern did not change after cure of infective endocarditis in our patient, possibly because the infection had been a complication of mitral valve prolapse and the shaggy pattern was due to the prolapse rather than the vegetations.

Abnormal shaggy echoes were seen more frequently on the posterior mitral leaflet (23 patients, five of whom had abnormal anterior leaflet echoes) than the anterior leaflet (16 patients). This could be due to more frequent and more extensive involvement of the posterior mitral leaflet by myxomatous degeneration.

Seven of 38 patients (18%) with mitral valve prolapse of <5 mm had abnormal shaggy echoes on the leaflets, whereas 27 of 47 patients (57%) with MVP of 5 mm or more had abnormal echoes on the valve cusps. A possible explanation is that patients with more severe prolapse had a greater degree of valvular redundancy and thus presented more surfaces for the production of echoes. We realize, however, that since the posterior mitral leaflet is a triscalloped structure and the scallops may prolapse to different degrees, the echocardiogram may not always assess accurately the severity of prolapse (since the ultrasound beam has a limited width and probably does not transect all the scallops). In addition to valvular redundancy, ventricular volume, i.e., the degree of “ventriculo-valvular” disproportion, also plays a role in determining the extent of MVP.

References

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