Midystolic retractions and late systolic waves have been noted on external carotid pulse tracings and apexcardiograms of patients with obstructive cardiomyopathy and mitral valve prolapse.1-3

Herein we report such recordings in a patient who had combined obliterative cardiomyopathy, mitral valve prolapse, and second-degree atrioventricular block.

Figure 1 shows the left ventricular angiogram from a 57-year-old woman who had varying degrees of atrioventricular block and dyspnea on exertion. Prolapse of the mitral valve leaflets and virtual end-systolic obliteration of the left ventricular midcavity are present. Figure 2 shows the simultaneously recorded phonocardiograms, external carotid pulse tracing, apexcardiogram, and electrocardiogram in this patient. A bigeminal rhythm occurred as a consequence of atrioventricular junctional escape beats followed by capture beats in the setting of a sinus mechanism with second-degree atrioven-

tricular block. Those beats (No. 1, 3, and 5; Fig 2) following longer pauses produced by blocked atrial depolarizations resulted in midystolic retractions on the carotid pulse and apex recordings. Nonejection midystolic sounds were heard and recorded at the mitral area in association with capture beats (No. 2 and 4; Fig 2).

In one series of subjects with obstructive or obliterative cardiomyopathy, mitral valve ballooning was noted in 68 percent of the patients.4 It has been proposed that the reduced end-systolic volume, occurring as a consequence of obliterative cardiomyopathy, permits the mitral valve leaflets to billow into the left atrium before proper chordal tensing.

The intermittent midystolic apexcardiographic and carotid pulse retractions described herein were similar to those observed after extrasystoles in patients with hypertrophic subaortic stenosis.5 It is likely that the escape-capture bigeminal rhythm, with diastolic pauses after blocked atrial depolarizations, resulted in enhanced left ventricular contraction and a greater degree of obliteration or mitral valve prolapse, or both. The interplay between prolapse and obstructive cardiomyopathy was indeed evident on the phonocardiogram. Those beats following blocked sinus impulses resulted in augmenta-

---

*From the Institute for Cardiovascular Diseases, Good Samaritan Hospital, Phoenix, Ariz. Supported in part by the E. Nichols and Kim Sigsworth Memorial Funds and the Institute for Cardiovascular Diseases, Inc.

Reprint requests: Dr. Benchimol, Good Samaritan Hospital, Phoenix, Arizona 85006
FIGURE 2. Simultaneously recorded phonocardiograms of mitral (MA), pulmonic (PA), and aortic (AA) areas, external carotid pulse tracing (CT), apexcardiogram (ACG), and lead 2 (L II) of ECG in 57-year-old woman with obliterative cardiomyopathy, mitral valve prolapse, sinus rhythm, second-degree atrioventricular block, and atrioventricular junctional escape beats. SM, Systolic murmur; and MSR, midsystolic retraction. Successive P waves are labeled, and QRS complexes are identified by number.

tion of the systolic murmur. On the other hand, conducted beats were associated with audible and recordable midsystolic clicks.

In conclusion, external pulse tracings are useful for demonstrating intracardiac phenomena in patients with coexisting obliterative cardiomyopathy and mitral valve prolapse.

ACKNOWLEDGMENTS: We wish to thank Ms. Carole Crevier, Ms. Jeanette R. Goff, Ms. Carol Graves, R.N., Ms. Connie Sheasby, and Ms. Sydney Peebles for technical assistance.

REFERENCES