Midystolic Carotid Pulse Wave Retraction in Subjects with Prolapsed Mitral Valve Leaflets

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Ventriculographic \(^1\) and echocardiographic \(^2\) studies have demonstrated that in some subjects, the syndrome of midystolic click and late systolic murmur \(^3\) is based on late systolic prolapse of mitral valve leaflets. We present here external carotid pulse tracings obtained from patients with angiographically documented prolapse of posterior mitral valve leaflets. All subjects had normal coronary arteriograms; there was no evidence of an aortic subvalvular pressure gradient at rest, during isoproterenol infusion, and after catheter provoked ventricular extrasystoles.

Figure 1 shows the simultaneous external carotid pulse tracing, tricuspid area phonocardiogram and apexcardiogram recorded in a 52-year-old man with mitral insufficiency secondary to prolapse of the posterior mitral valve leaflet. Note the midystolic retractions of the carotid and apexcardiographic recordings which are inscribed concurrently with the midystolic clicks. Figure 2 is a composite of carotid pulse tracings from four other patients with documented prolapse of their mitral valve leaflets.

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**Figure 1.** Simultaneous external carotid pulse tracing (CT), tricuspid area phonocardiogram (TA), apexcardiogram (ACG) and lead II of the electrocardiogram (LII) recorded from a 52-year-old man with mitral insufficiency secondary to prolapse of the posterior mitral valve leaflet. (SR = systolic retraction, DN = dicrotic notch, 1 = first heart sound, C = midystolic click, SM = systolic murmur, 2 = second heart sound). (See discussion.)

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The systolic retractions occur during or immediately after recording of the midsystolic clicks on the phonocardiograms.

There are several possible mechanisms which might account for the midsystolic carotid pulse wave retractions noted in these subjects with midsystolic clicks and late systolic murmurs. Abrupt midsystolic left ventricular decompression secondary to the mitral valve prolapse probably plays a dominant role. We have also noted that assumption of the upright position and inhalation of amyl nitrite tend to move the click\(^1\) and systolic retraction toward the first heart sound. This latter finding suggests that these maneuvers evoke an earlier left ventricular systolic decompression.

Midsystolic carotid pulse retraction is, however, a nonspecific finding, and has been noted in some proved normal subjects. Furthermore, identical carotid pulse wave variations have been observed in patients with midsystolic clicks, late systolic murmurs and hemodynamically significant hypertrophic subaortic stenosis.\(^3\) Before attributing the click, the murmur or the carotid pulse retraction to isolated mitral valve prolapse,\(^6\) it is necessary to exclude other causes of the syndrome such as cardiomyopathy, coronary artery disease, rheumatic heart disease and atrial septal defect.\(^7\) It is thus apparent that although the abnormal external carotid pulse tracing may be a clue to underlying ventricular dysfunction, cardiac catheterization studies may be necessary to determine the final etiology.

**REFERENCES**