Left Ventricular Outflow Tract Blood Velocity in Hypertrophic Subaortic Stenosis*

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Angiographic and echocardiographic studies have demonstrated that subjects with hypertrophic subaortic stenosis display an abnormal systolic outflow tract narrowing brought about by apposition of a paradoxically moving anterior mitral leaflet and a hypertrophic interventricular septum. The hemodynamic consequence of such obstruction is the development of a fluctuant gradient between the inflow and outflow tracts of the left ventricle with attendant changes in the contour of the pressure pulse.

In 1968, it was demonstrated that the measurement of phasic continuous arterial blood velocity, by means of Doppler flowmetry, was useful for the diagnosis of hypertrophic subaortic stenosis. Characteristic reductions of midsystolic blood flow velocities in association with obstructive cardiomyopathy were subsequently confirmed by other investigators. Recent study has shown that it is feasible to directly measure blood velocity in the left ventricle of man with a Doppler ultrasonic flow meter catheter. We report here the direct measurement of blood velocity in the outflow tract of a patient with idiopathic hypertrophic subaortic stenosis.

Figure 1 shows the simultaneously recorded lead 2 (L II) of the electrocardiogram, femoral arterial pressure and instantaneous left ventricular outflow tract blood velocity in a 28-year-old man with documented hypertrophic subaortic stenosis. There is a sharply inscribed early ejection blood velocity wave which indicates adequate myocardial contrac-

![Figure 1. Simultaneously recorded lead 2 (L II) of the electrocardiogram, femoral arterial pressure and left ventricular outflow tract blood velocity in a 28-year-old man with idiopathic hypertrophic subaortic stenosis. Note the midsystolic retractions and late systolic waves on the pressure and blood velocity records.](image-url)
tility at this period of the cardiac cycle. The initial rapid upstroke is followed by a midsystolic retraction, indicating the abrupt deceleration of the left ventricular blood cells at the time of outflow tract obstruction. A terminal late systolic wave is inscribed during a period when the anterior mitral leaflet retracts, thereby “opening up” the outflow tract and permitting secondary left ventricular ejection.

Striking midsystolic troughs in phasic left ventricular blood velocity waveforms as described here provide the basis for abnormal peripheral arterial blood velocities previously demonstrated in subjects with hypertrophic stenosis. The Doppler ultrasonic flow meter catheter provides an elegant method for graphically displaying the basic alterations of blood flow in this dynamic condition.

REFERENCES
5 Benchimol A, Desser KB, Gartlan JL Jr: Left ventricular blood flow velocity in man studied with the Doppler ultrasonic flow meter. Am Heart J 85:294-301, 1973