The Brockenbrough-Braunwald-Morrow sign

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This work was supported by the Paul and Ruby Tsai Family.

Disclosures: Authors have nothing to disclose with regard to commercial support.

Received for publication March 9, 2018; accepted for publication April 24, 2018; available ahead of print June 5, 2018.

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J Thorac Cardiovasc Surg 2018;156:1614-5

0022-5223/\$36.00

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<https://doi.org/10.1016/j.jtcvs.2018.04.095>

The Brockenbrough-Braunwald-Morrow sign was first described in patients with obstructive hypertrophic cardiomyopathy (HCM) by Brockenbrough and colleagues¹ in

FIGURE 1. Brockenbrough-Braunwald-Morrow sign in obstructive hypertrophic cardiomyopathy. A, Left ventricular pressure tracing superimposed on aortic pressure tracing shows a typical Brockenbrough-Braunwald-Morrow sign before septal myectomy, with significant decrease in pulse pressure after a premature ventricular contraction. B, In the post-bypass tracing, after septal myectomy, it can be seen that the premature ventricular contraction did not trigger the Brockenbrough-Braunwald-Morrow sign. Red line indicates left ventricular pressure tracing; blue line indicates aortic pressure tracing; brackets indicate pulse pressure before and after premature ventricular contraction. ECG, Electrocardiogram.

The Brockenbrough-Braunwald-Morrow sign in a patient with obstructive HCM.

Central Message

The Brockenbrough-Braunwald-Morrow sign is characteristic of dynamic LV outflow tract obstruction, as is seen in obstructive HCM, but is uncommon in fixed valvular or subvalvular obstruction.

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the 1960s. This sign is characterized by a decrease in arterial pulse pressure after a premature ventricular contraction (PVC), accompanied by a significant increase in peak left ventricular (LV) systolic pressure. In patients without dynamic outflow obstruction, the longer filling period after a PVC increases LV end-diastolic volume; this and postextrasystolic potentiation increase both stroke volume and arterial pulse pressure.^{1,2} In patients with obstructive HCM, provocation with a PVC leads to a paradoxical decrease in pulse pressure. Maneuvers to elicit the Brockenbrough-Braunwald-Morrow sign are frequently used to establish the diagnosis of obstructive HCM during cardiac catheterization and to assess the adequacy of septal reduction after surgical myectomy or alcohol septal ablation.^{3,4}

Figure 1 illustrates the Brockenbrough-Braunwald-Morrow sign in a 65-year-old man with obstructive HCM before and after transaortic septal myectomy. For comparison, we present intraoperative pressure tracings from 2 patients with fixed LV outflow tract obstruction. The patient in Figure 2 is a 69-year-old man with aortic valvular stenosis, and Figure 3 shows pressure tracings from a 64-year-old woman with membranous and tunnel subaortic stenosis not associated with systolic anterior motion of the mitral valve.

At operation, LV and aortic pressures were simultaneously traced with high-fidelity catheters before and after cardiopulmonary bypass. We observed the Brockenbrough-Braunwald-Morrow sign in the patient with obstructive

FIGURE 2. Left ventricular pressure tracing superimposed on aortic pressure tracing in a patient with valvular aortic stenosis. A, In this patient, pulse pressure did not change after a premature ventricular contraction. B, No post-premature ventricular contraction changes in pulse pressure are seen after aortic valve replacement. Red line indicates left ventricular pressure tracing; blue line indicates aortic pressure tracing; brackets indicate pulse pressure before and after premature ventricular contraction. ECG, Electrocardiogram.

HCM (Figure 1, A), with a significant decrease in arterial pulse pressure after a PVC. The sign disappeared after septal myectomy, and pulse pressure remained stable after provocation (Figure 1, B). In the 2 patients with aortic stenosis and subvalvular stenosis (Figures 2 and 3), prebypass arterial pulse pressure did not change after PVC. As expected, the Brockenbrough-Braunwald-Morrow sign could not be elicited in these patients.

FIGURE 3. Left ventricular pressure tracing superimposed on aortic pressure tracing in a patient with membranous and tunnel subaortic stenosis. A, No post-premature ventricular contraction change in pulse pressure was seen before the operation. B, After membranectomy and myectomy, there was a slight widening of arterial pulse pressure after premature ventricular contraction. Red line indicates left ventricular pressure tracing; blue line indicates aortic pressure tracing; brackets indicate pulse pressure before and after premature ventricular contraction. ECG, Electrocardiogram.

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