Brockenbrough–Braunwald–Morrow sign and Valsalva manoeuvre: how to unmask dynamic left ventricular outflow tract obstruction

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A 71-year-old patient with Influenza A pneumonia presented with resting chest pain. Rise in cardiac troponin T (peak 188 ng/L, normal <14.0 ng/L) and diffuse downsloping electrocardiographic ST-depression allowed the diagnosis of non-ST-elevation myocardial infarction to be made. On echocardiography, there was left ventricular (LV) hypertrophy (septum 21 mm, posterior wall 15 mm; Supplementary data online, Video S1): LV ejection fraction was 70%, without segmental wall motion abnormality. LV outflow maximal velocity was 2.2 m/s (Panel A), with incomplete systolic anterior motion (SAM) of the mitral valve (Panel C) and mild mitral regurgitation (Panel E). However, during the beat following a premature ventricular contraction (*), the SAM became complete (arrowhead, Panel D), and the peak velocity was 7 m/s (Panel A), with the occurrence of severe mitral regurgitation (Panel F, Supplementary data online, Video S2). The Valsalva manoeuvre also provoked a 7 m/s LV outflow tract peak velocity (Panel G). Coronary angiography demonstrated left main coronary artery and right coronary artery stenosis. Simultaneous LV and aortic pressure recording demonstrated a 120 mmHg peak-to-peak pressure gradient during the first sinus beat after the premature contraction (*) and reduced pulse pressure (double arrows) (Panel B). Coronary artery bypass grafting and septal myectomy were subsequently performed.

The Brockenbrough–Braunwald–Morrow sign has been described in patients with hypertrophic obstructive cardiomyopathy. It is characterized by a paradoxical decrease in arterial pulse pressure and by increased intraventricular pressure gradient during the beat following a premature contraction. This contrasts with the increased pulse pressure and stroke volume observed in patients without dynamic LV outflow tract obstruction. The Valsalva manoeuvre can also unmask latent LV obstruction. Detection of latent LV obstruction has important implications for peri-operative management, particularly with regard to beta-blockers use and avoidance of volume depletion and of inotropes.

Supplementary data are available at European Heart Journal - Cardiovascular Imaging online.