Dynamic auscultation in hypertrophic obstructive cardiomyopathy: what can we learn from a murmur?

D. Brian Newman, William R. Miranda, Jeffrey B. Geske*, and Rick A. Nishimura
Division of Cardiovascular Diseases, Mayo Clinic, Rochester, MN, USA
* Corresponding author. Tel: +1 507 284 1648, Fax: +1 507 266 0228, Email: geske.jeffrey@mayo.edu

Dynamic left ventricular outflow tract (LVOT) obstruction and mitral leaflet systolic anterior motion (SAM) are complex haemodynamic features of hypertrophic cardiomyopathy (HCM). Dynamic auscultation remains a mandatory step in clinical assessment; augmentation of the crescendo-decrescendo systolic murmur with reduced preload (Valsalva maneuver, amyl nitrite, and squat-to-stand) and diminution with increased afterload (handgrip and inspiration) are classic diagnostic features.

Herein we present a combination of diagnostic findings (Panel A) from a 35-year-old woman who presented with syncope. Examination revealed a sustained apical impulse, bifid carotid upstrokes and a 3/6 systolic murmur at the right upper sternal border that increased on expiration and decreased on inspiration (Supplementary material online, Sound Clip S1). Multimodality imaging clearly demonstrated the complex haemodynamic effects in this patient with HCM and dynamic obstruction. Transthoracic echocardiography demonstrated asymmetric basal septum hypertrophy with a maximal instantaneous LVOT gradient of 108 mmHg. The onset and duration of SAM septal-leaflet contact (Panel A2) correlated with the pressure gradient on continuous wave Doppler and intra-operative cardiac pressure tracings (Panel A3 and 4). Premature closure of the aortic valve accompanied the abrupt cessation of forward systolic flow (Panel A5). The resultant bifid aortic pulse contour, evident in the abdominal aorta (Panel A7), corresponded to the carotid pulse examination.

Panel A1 confirmed the bedside auscultatory findings: a mid-peaking systolic ejection murmur with expiratory augmentation provided key insights into her diagnosis and hemodynamic findings. Dynamic respiratory variation of the murmur resulted from differences in ventricular loading. Left ventricular afterload increased with inspiration, resulting in a reduction in both the LVOT obstruction and murmur.

Supplementary material is available at European Heart Journal online.