Kardiologia Polska 2017; 75, 8: 813; DOI: 10.5603/KP.2017.0156 ISSN 0022–9032

STUDIUM PRZYPADKU / *CLINICAL VIGNETTE*

Four-dimensional flow magnetic resonance imaging in hypertrophic obstructive cardiomyopathy

Obrazowanie przepływu za pomocą techniki 4D *flow* u pacjenta z kardiomiopatią przerostową zawężającą

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A 17-year-old female patient with hypertrophic cardiomyopathy (HCM) with left ventricular outflow tract (LVOT) obstruction was admitted for cardiac evaluation due to progressive symptoms of heart failure in addition to several episodes of exertional syncope/presyncope with concomitant hypotension and bradycardia. The patient was treated with beta-adrenolytic (propranolol 40 mg three times a day). She underwent standard-of-care assessment including electrocardiogram Holter monitoring (no significant arrhythmias were detected) and transthoracic echocardiography, which revealed significant LVOT obstruction with a peak instantaneous Doppler pressure gradient of 82 mm Hg and maximal interventricular septum thickens of 18 mm. Additionally, the patient was referred for cardiac magnetic resonance (CMR) study, which is a standard of practice in HCM patients at our institution. The study revealed mild-to-moderate left ventricular hypertrophy (Fig. 1B). Systolic anterior motion of the anterior leaflet of the mitral valve causing LVOT obstruction was clearly seen (**Suppl. Video 1** [cine steady-state free precession images] — **see journal website**, Fig. 1B — diastolic image, Fig 1C — systolic image). No significant systolic anterior motion-related mitral regurgitation was present. Additionally, time-resolved three-dimensional (3D) phase-contrast CMR with three-directional velocity encoding (four-dimensional [4D] flow) was acquired, clearly demonstrating LVOT obstruction (**Suppl. Video 2 — see journal website**, Fig. 1A — 4D flow CMR-generated streamlines colour-coded with velocity magnitude). For comparison (Fig. 1D, right), we demonstrate 4D flow image in a patient referred for CMR due to suspected HCM (the disease was eventually excluded) without LVOT obstruction (streamlines are colour-coded with the same velocity magnitude as for the obstructive HCM patient). Moreover, mid-wall fibrosis, identified by late gadolinium enhancement areas in the intraventricular septum was demonstrated. Considering the presence of heart failure symptoms as well as syncope/presyncope episodes despite optimal medical treatment, the patient was referred for septal reduction therapy, namely surgical myectomy. The images highlight the potential use of 4D flow CMR in the assessment of patients with HCM. Further studies are needed to evaluate its role in this population.

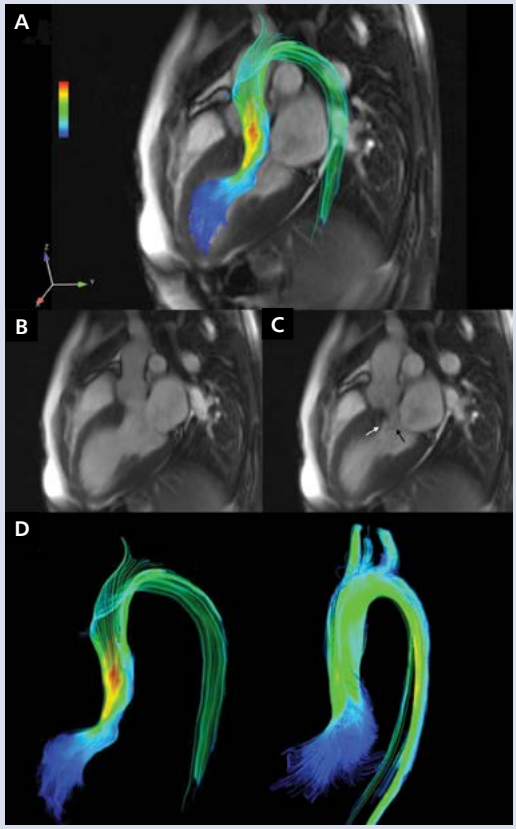

Figure 1. Cardiac magnetic resonance (CMR) images; **A.** Fusion image of CMR-generated streamlines colour-coded with velocity magnitude and three-chamber view; **B.** Three-chamber diastolic image; **C.** Three-chamber systolic image. Systolic anterior motion of the anterior mitral valve leaflet is seen (black arrow) causing left ventricular outflow tract obstruction (white arrow); **D.** Comparison of four-dimensional flow images in a patient with obstructive hypertrophic cardiomyopathy (left) and a patient without left ventricular outflow tract obstruction (right)

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Conflict of interest: *This work was supported by the Ministry of Science and Higher Education, Iuventus Plus (grant number IP 2014 0477 73 to M. Śpiewak).*