Usefulness of transthoracic Doppler echocardiography for noninvasive assessment of coronary blood flow in a patient with symptomatic myocardial bridging

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Myocardial bridging (MB) is a congenital anomaly characterized by systolic compression of the tunneled arterial segment, which is located mainly in the mid portion of the left anterior descending (LAD) coronary artery. Although MB is commonly considered a benign variation, recent studies suggest that MB may cause recurrent chest pain, myocardial ischaemia, myocardial infarction, life-threatening arrhythmias, or even sudden cardiac death. Currently, beta-blockers or calcium channel blockers are recommended as first-line medical therapy in patients with symptomatic MB. With the use of an invasive, intracoronary Doppler flow wire, it has been shown that the intravenous administration of a beta-blocker can normalize the abnormal coronary blood flow in MB. However, the long-term efficacy of beta-blockers on abnormal coronary blood flow in MB is not clear. In this case report, we demonstrate the usefulness of transthoracic Doppler echocardiography for noninvasive, long-term assessment of coronary blood flow.

Case report

A 60-year-old woman was referred to our hospital for increasing effort angina. She had no coronary risk factors, including hypertension, dyslipidaemia, smoking, and diabetes mellitus. Her electrocardiogram was normal. To investigate possible coronary artery disease, coronary CT angiography (CTA) with 64-multi-detector computed tomography was performed. Significant stenosis in the coronary arteries could not be detected by CTA. However, CTA revealed systolic luminal narrowing due to MB in the mid portion of the LAD coronary artery, despite an absence of constriction during diastole (Figure 1). Transthoracic echocardiography demonstrated normal ventricular function without significant cardiac hypertrophy. Coronary flow velocity recordings were obtained with a Vivid 7 Dimension ultrasound machine (GE Healthcare). Aliasing of coronary flow was detected in the mid portion of LAD at the baseline examination. Moreover, the Doppler flow velocity profile showed the characteristic ‘finger-tip’-like flow velocity acceleration during early diastole (Figure 2A). One month after beta-blocker therapy with bisoprolol (5.0 mg/day), the angina was relieved and the aliasing of coronary flow and the ‘finger-tip’-like flow velocity acceleration disappeared (Figure 2B).

Discussion

Early diastolic flow acceleration, the ‘finger-tip’ phenomenon, occurs frequently in patients with MB. Abnormal coronary blood flow in the...
tunnelled arterial segment is considered one of the causes of myocardial ischaemia. Our case provides new insight into the beneficial haemodynamic actions of chronic beta-blocker therapy in symptomatic MB. In addition, transthoracic Doppler echocardiography is a noninvasive, practical tool to evaluate the effect of medical therapy on the coronary circulation in patients with MB.

Conflict of interest: none declared.

References

Figure 1 MDCT images of symptomatic myocardial bridging. (A) Volume-rendered image during diastole. (B) Volume-rendered image during systole. White arrows, systolic luminal narrowing; MDCT, multi-detector computed tomography.

Figure 2 Haemodynamic alterations after beta-blocker therapy evaluated by TTDE. (A) Coronary flow characteristics at the baseline examination. Aliasing of coronary flow occurs in the mid portion of the LAD (red arrows). ‘Finger-tip’-like flow velocity acceleration occurs during early diastole (white arrows). (B) Aliasing of coronary flow and the ‘finger-tip’ phenomenon disappeared after 1 month of beta-blocker therapy. LAD, left anterior descending coronary artery; TTDE, transthoracic Doppler echocardiography.