CLINICAL VIGNETTE

Left ventricular noncompaction associated with genetic disturbance of folic acid metabolism

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A 32-year old woman underwent a preoperative clinical examination before a planned breast surgery. Frequent polymorphic premature ventricular beats were observed on electrocardiography. She had never had any symptoms in the past, and no history of cardiovascular or rheumatic diseases.

The patient was examined by a cardiologist. 24-hour ambulatory electrocardiography monitoring showed sinus rhythm and 8500 evenly distributed polymorphic premature ventricular beats, including 432 coupled extrasystoles.

Cardiac echocardiography showed normal cardiac chambers and nonaffected valvular structures, high trabecularity of the left ventricle, and reduced ejection fraction (36%). Left ventricular noncompaction was considered.

Cardiac magnetic resonance imaging with contrast enhancement was performed and confirmed left ventricular noncompaction with reduced systolic function.

Left ventricular end-diastolic volume was 200 ml, end-systolic volume, 131 ml, end-diastolic volume index, 122 ml/m^2, end-systolic volume index, 80 ml/m^2, stroke volume, 68 ml, cardiac output, 3.78 l/min, left ventricular ejection fraction, 34%. Diffusely reduced myocardial contractility was detected, but it was more pronounced in lateral-inferior-septal region. Interventricular septum was 11.8 mm, inferior wall, 13.7 mm. High trabecularity of subendocardial region was found. End-diastolic ratio of layers was 2.3 in segments 7, 12, and 15 to 17. Subacute myocarditis was suspected based on edema in the interventricular septum with signs of inflammation located in the lateral-inferior region of the left ventricle associated with mild elevated levels of C-reactive protein (2.68 mg/l) and high-sensitivity troponin T (22.0 ng/l) subacute myocarditis was suspected (FIGURE 1). Myocardial biopsy was not performed for technical reasons.

Patient was referred for genetic testing. Two mutations were found: methylenetetrahydrofolate reductase (MTHFR) 1298 homozygote CC and MTHFR 677 heterozygote CT. Patient's relatives did not undergo genetic testing. No hereditary cardiovascular diseases in close relatives were documented.

The patient received recommendations to delay surgical procedure and start medical treatment with amiodarone. During follow-up, the patient had no complaints, no clinical signs of heart failure, and no thromboembolic events.

Left ventricular noncompaction is a cardiomyopathy caused by impaired evolution of pre-natal myocardial compaction process. During embryogenesis, the intertrabecular recesses interact with the left ventricular endocardium, which leads to the formation of myocardial capillaries.[1] Left ventricular noncompaction can present as isolated abnormality or in combination with other hereditary structural defects such as Ebstein's anomaly, bicuspid aortic valve, coronary arteries abnormalities, and septal defects.[2]

MTHFR gene codes MTHFR protein that is responsible for intracellular homocysteine transformation to methionine. This enzyme requires pyridoxine, cyanocobalamin, and folic acid to perform its biological role. Detected gene mutations are known to be associated with structural conformation changes of MTHFR protein binding sites responsible for binding to folic acid. Alterations of the folic acid intracellular metabolism during embryogenesis results in neural tube malformations.[3,4] One of them is left ventricular noncompaction.

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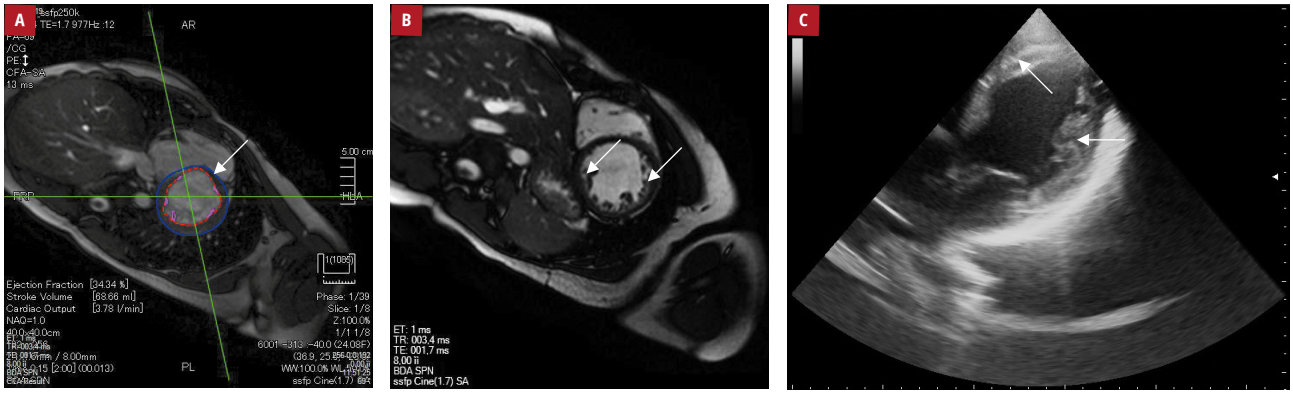

FIGURE 1 Cardiac magnetic resonance imaging (**A**, **B**) and echocardiography (**C**) showing left ventricular noncompaction. The arrows show the pathological hypertrabeculation of the left ventricle with 2 myocardial layers—normal and noncompacted

Also, we need to take into account the possible role of comorbid subacute myocarditis on left ventricular noncompaction as the additional factor for myocardial heterogeneity. Interestingly, the association of myocarditis with left ventricular noncompaction has been previously described.[5]

Of note, sporadic mutation of genes responsible for folic acid metabolism can lead to formation of left ventricular noncompaction. This cardiomyopathy may be asymptomatic for a prolonged period (which can last for decades). Comorbid subacute myocarditis can probably increase the risk of clinically significant arrhythmias.

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

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