Biventricular assist device–induced recovery from acute heart failure in peripartum cardiomyopathy on cardiac magnetic resonance imaging

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A 26-year-old woman presented with acute-onset heart failure 3 days after giving natural birth to a healthy infant (gravida 1, para 1). Echocardiography revealed an enlarged left ventricular end-diastolic diameter of 68 mm, decreased left ventricular ejection fraction (LVEF) of 17%, and moderate mitral regurgitation. The patient was diagnosed with peripartum cardiomyopathy (PPCM) and referred for cardiac magnetic resonance imaging (MRI), which confirmed a severely dilated left ventricle (LV) with impaired ejection fraction of 19% (Supplementary material, *Videos S1* and *S2*). Right ventricular (RV) volumes and function were normal with RVEF of 52%. On T2-weighted imaging, no rise in the T2 signal was noted. Importantly, T1-mapping revealed a significant increase in the T1 signal in the interventricular septum (T1 = 1352 ms; mean [SD] reference range, 940.7 [49.2] ms) despite lack of late gadolinium enhancement (FIGURE 1). Extracellular volume (ECV) was significantly elevated at 36%. Laboratory tests showed the elevated levels of N-terminal fragment of the prohormone brain natriuretic peptide and high-sensitivity troponin T: 10 275 pg/ml (reference range <125 pg/ml) and 52.78 ng/l (reference range <14 ng/l), respectively.

In the following days, the patient developed cardiogenic shock and required arteriovenous extracorporeal membrane oxygenation. On day 42 after delivery, the treatment was converted into the use of the first Polish pulsatile-flow mechanical circulatory support system—POLCAS. First, the LV was supported by the cannulation from the LV to the aorta. Two weeks later, due to RV function deterioration, the RV POLCAS system was implanted. The clinical course was complicated by device-related thrombus formation despite anticoagulation and, therefore, the device was explanted on day 88 after delivery. At that stage, LVEF ranged between 25% and 30% on echocardiography. The subsequent cardiac MRI scan revealed a significant improvement in the contractility of the basal and mid segments of the LV, while apical akinesia and tethering were observed in the region of the scar after removing the LV assist device (Supplementary material, *Videos S3* and *S4*). The LV and RV volumes were normal with LVEF of 35% and RVEF of 46%. Importantly, on T1 mapping, the T1 signal dropped to 1104 ms (FIGURE 1). The patient's status gradually improved and the woman was discharged home with New York Heart Association class II. At 6-month follow-up, the level of N-terminal fragment of the prohormone brain natriuretic peptide decreased to 1019 pg/ml, and the high-sensitivity troponin T level was within reference range.

Peripartum cardiomyopathy is a rare and potentially life-threatening condition. Several studies demonstrated that the presence of LVEF <30% and left ventricular end-diastolic

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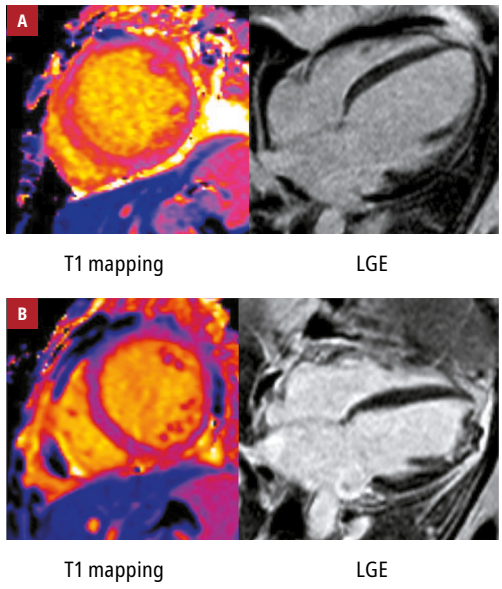

FIGURE 1 Cardiac magnetic resonance imaging at baseline (**A**) and following the treatment with a biventricular assist device (**B**) in a patient with peripartum cardiomyopathy
Abbreviations: LGE, late gadolinium enhancement

diameter >60 mm is associated with unfavorable outcomes.[1] Although echocardiography is the most commonly available imaging modality, cardiac MRI with native T1 mapping offers a unique, noninvasive way to evaluate myocardial fibrosis and measure ECV. Cardiac MRI plays a crucial role in the management of various types of cardiomyopathy.[2,3] Increased ECV, with a cutoff value of 32.5%, has been associated with worse outcomes in PPCM.[4] The case of our patient indicates that prompt heart failure treatment with bromocriptine and assist devices, if needed, may lead to favorable outcomes. As the signs of fibrosis can be detected by cardiac MRI at an early disease stage, we suggest using cardiac MRI with T1 and T2 mapping in every patient with PPCM on admission to guide the management and predict the outcome. Furthermore, cardiac MRI can help to accurately assess apical akinesia and scarring resulting from LV assist device implantation.

SUPPLEMENTARY MATERIAL

Supplementary material is available at www.mp.pl/kardiologiapolska.

ARTICLE INFORMATION

CONFLICT OF INTEREST None declared.

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