Percutaneous deactivation of a left ventricular assist device due to pump thrombosis

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A left ventricular assist device (LVAD) is indicated in patients with advanced heart failure and is most commonly used as destination therapy or bridge to heart transplantation [1, 2]. Recently, with the development of the third generation of these devices, a significant decrease in the number of LVAD-related thromboembolic complications has been observed [3]. However, patients with an LVAD may still experience serious adverse events. We present a patient with a continuous-flow LVAD in whom the device was successfully deactivated with percutaneous Amplatzer implantation due to pump thrombosis.

A 62-year-old male with a history of advanced heart failure with reduced left ventricular ejection fraction (LVEF, 20%) due to dilated cardiomyopathy and pulmonary hypertension after LVAD implantation in 2018 (Heartware HVAD, Heartware International, Framingham, Massachusetts) as a bridge to transplantation was admitted to a tertiary cardiovascular center following a critical LVAD alarm. On admission, the patient reported weakness and reduced exercise capacity for the previous several hours. Laboratory assessment revealed elevated lactate dehydrogenase (LDH): 372 U/L (n = 125–220) and NT-proBNP: 4017 pg/ml (n <125), while International Normalised Ratio (INR) was 1.96. Transthoracic echocardiography confirmed LVAD thrombosis with no flow in the LVAD outflow cannula. Computed tomography angiography of the aorta depicted a patent conduit between the aorta and the LVAD.

Subsequently, catheter-based percutaneous LVAD deactivation with implantation of an Amplatzer occluder to the LVAD outflow graft was performed (Figure 1A, B, Supplementary material, *Video S1,* and *S2*). The patient was not LVAD-dependent and remained hemodynamically stable; he was treated with

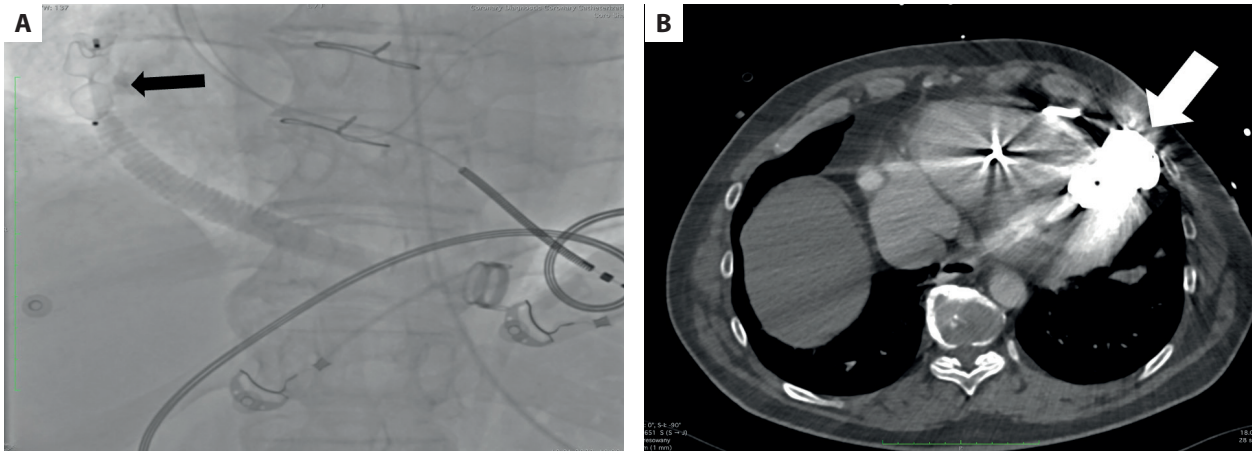

Figure 1. A. Angiography after implantation of the Amplatzer occluder to the left ventricular assist device outflow graft, an arrow shows the Amplatzer occluder. **B.** Computed tomography angiography of the aorta. An arrow shows an inflow cannula

levosimendan and required no catecholamines. LVEF remained stable during hospitalization. Anticoagulation was continued. Two weeks after LVAD deactivation, right heart catheterization was performed, and no pulmonary hypertension was found. After discussion, the Heart Team qualified the patient for an urgent heart transplantation. The hospitalization was uneventful and after two weeks the patient requested to be discharged from the hospital against medical advice. The patient remained hemodynamically stable at 1-month follow-up. Although the heart donor was found after 14 days, the operation was not performed because the patient had died at home due to sudden cardiac arrest shortly before the planned procedure. The patient's family refused to give consent for an autopsy of the deceased.

Pump thrombosis is a potentially lethal complication of LVAD therapy that may occur as a result of different mechanisms [4]. Percutaneous LVAD deactivation is a relatively safe and effective method that can be used in properly selected patients as an alternative to surgical treatment in pump thrombosis [5]. Based on our experience, we believe that a patient with pump thrombosis should be regarded as an urgent heart transplant candidate provided there are no contraindications for heart transplantation.

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/kardiologia_polska.

Article information

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REFERENCES

1. Flowers RC, Kittipibul V, Chaparro S. Left ventricular assist device deactivation following cardiac recovery and pump thrombosis. Heart Lung. 2022; 51: 22–24, doi: 10.1016/j.hrtlng.2021.09.004, indexed in Pubmed: 34731693.
2. Trębacz J, Wierzbicki K, Sobczyński R, et al. Transcatheter aortic valve replacement in a patient with severe aortic regurgitation following left ventricular assist device implantation. Kardiol Pol. 2023; 81(1): 68–69, doi: 10.33963/KP.a2022.0217, indexed in Pubmed: 36106849.
3. Mehra MR, Naka Y, Uriel N, et al. A fully magnetically levitated circulatory pump for advanced heart failure. N Engl J Med. 2017; 376(5): 440–450, doi: 10.1056/NEJMoa1610426, indexed in Pubmed: 27959709.
4. Doita T, Kawamura T, Inoue K, et al. Sudden severe left ventricular assist device inflow cannula obstruction caused by huge thrombus after closure of mechanical aortic valve: case report. J Artif Organs. 2022; 25(4): 364–367, doi: 10.1007/s10047-022-01332-5, indexed in Pubmed: 35445295.
5. Albulushi A, Goldsweig AM, Stoller D, et al. Percutaneous deactivation of left ventricular assist devices. Semin Thorac Cardiovasc Surg. 2020; 32(3): 467–472, doi: 10.1053/j.semtcvs.2020.01.012, indexed in Pubmed: 32057968.