VIA MEDICA

CASE REPORT

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A case of a patient treated with percutaneous edge-to-edge mitral valve repair, percutaneous left atrial appendage occlusion and implantable cardioverter-defibrillator

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ABSTRACT

The article presents the case of a 55-year-old woman who suffered from anterior myocardial infarction and chronic complications of the underlying disease, heart failure with reduced left ventricular ejection fraction, severe secondary mitral regurgitation, and paroxysmal atrial fibrillation. Due to the severity of symptoms, which persisted despite the optimal pharmacotherapy, after exclusion of reversible causes, the patient was qualified for different advanced percutaneous treatment methods. Within two years from the onset of the disease, three percutaneous procedures were performed: mitral valve correction with the MitraClip system, left atrial appendage occlusion using the Watchman system, and implantation of cardioverter-defibrillator.
Key words: heart failure with reduced ejection fraction, mitral regurgitation, percutaneous edge-to-edge mitral valve repair, left atrial appendage occlusion, implantable cardioverter-defibrillator

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Introduction

The prevalence of heart failure (HF) concerns 1–2% of the adult population in developed countries. Many patients have cardiovascular and non-cardiac abnormalities that may result in HF. Therefore, the identification of these abnormalities should be part of the diagnostic process, because many of these causes can be reversible [1–4]. Epidemiological data from European studies (ESC-HF pilot study) indicate that the 12-month total HF mortality rate in hospitalized patients or those under outpatient care was 17% and 7%, respectively, and the 12-month hospitalization rates were 44% and 32% in both groups. In HF patients most deaths are caused by cardiovascular events. Sudden deaths and deaths related to the disease exacerbation are most common in this group of patients [5].

The acute anterior myocardial infarction

The 55-year-old patient was admitted to the Department of Cardiology at University Hospital in Bydgoszcz on December 15, 2014, due to the acute anterior myocardial infarction. The patient had no history of chronic diseases, apart from long-term smoking. The urgent primary percutaneous coronary intervention of the left anterior descending artery with implantation of drug-eluting stent (DES) was performed. The procedure was complicated by sudden cardiac arrest in the mechanism of asystole with effective cardiopulmonary resuscitation. In addition, during the hospitalization, the first atrial fibrillation (AF) episode occurred (according to the CHA_2DS_2-VASc score — 4 points, according to the HAS-BLED score -1 point). Echocardiographic examination revealed: impaired left ventricular systolic function with reduced left ventricular ejection fraction (LVEF) of 20-25%, diastolic relaxation dysfunction, severe secondary mitral regurgitation with vena contracta (Vc) of 0.9 cm, severe tricuspid valve regurgitation, systolic pulmonary artery pressure (SPAP) of 52 mm Hg, features of pulmonary hypertension, enlargement of all heart chambers: left atrium (LA) 51 mm, left ventricular end-systolic diameter (LVESD) of 50 mm, left ventricular end-diastolic diameter (LVEDD) of 60 mm, right ventricle (RV) of 40 mm, akinetic apical aneurysm, akinesis of the other segments of anterior and interventricular

septum. Vitamin K antagonist (warfarin) per patient's choice was introduced to the therapy. The patient was discharged in functional class II according to New York Heart Association (NYHA) with a further therapeutic plan including among others echocardiographic control.

Decompensation of chronic heart failure

Subsequent hospitalization of the patient was associated with episodes of decompensation of chronic heart failure up to NYHA class IV with B-type natriuretic peptide (BNP) > 2000 pg/mL. The ECG on admission revealed sinus rhythm 88/min, the small progression of R waves in V1–V4, no ST–T changes, QRS complex < 110 ms. Echocardiographic parameters were the same as previously. The patient underwent coronary angiography which has not shown any new lesions in the coronary arteries or restenosis. After the Heart Team consultation, the patient was disqualified from the surgical treatment of mitral valve regurgitation. Therefore, the patient underwent transthoracic and transesophageal echocardiography (TEE) to fully assess mitral valve morphology. TEE revealed severe mitral regurgitation wave with Vc of 0.9 cm, thickened leaflets of mitral valve with features of limited restriction, mitral wave area (MVA) of 3.8 cm2, coaptation depth of 0.8 cm, coaptation height of 0.6 cm, length of anterior leaflet 2.6 cm, length of posterior leaflet 1.6 cm, severe tricuspid regurgitation wave, and thrombus-free left atrium appendage.

Percutaneous edge-to-edge mitral valve correction

During the next hospitalization approximately a year after myocardial infarction, percutaneous edge-to-edge mitral valve correction with the use of the MitraClip system was performed without periprocedural complications. Two clips were implanted, resulting in a reduction of the mitral regurgitation wave. In the follow-up echocardiography, two MitraClip sets were found in the normal position without device-related thrombi, and two narrow mitral regurgitation waves were observed (Vc 0.4–0.5 cm). Patients general condition improved after the procedure. Due to the above-mentioned procedure, dual antiplatelet therapy consisting of aspirin 75 mg once daily and clopidogrel 75 mg once daily, with warfarin (the patient continued to refuse non-vitamin K antagonist anticoagulation due to financial reasons).

Percutaneous left atrial appendage occlusion

Another scheduled hospitalization was associated with routine follow-up after the previous procedure. Laboratory tests revealed a non-therapeutic International Normalized Ratio (INR) index of 6.5 and normocytic anaemia (Hgb 9.0 g/dL, MCV 81.5 fL). According to the patient from the beginning of the anticoagulation treatment, she was not able to obtain stable INRs and periodically reported tarry stools. The time in the therapeutic range of INR was rated at < 60% for this patient. The gastroduodenoscopy revealed a non-bleeding vessel (Forrest IIa) in the duodenum. Recalculated CHA_2DS_2-VASc score was 4 points, and HAS-BLED score was 3 points. The patient was qualified for left atrial appendage occlusion. Intraprocedural TEE did not reveal thrombi in the left atrial appendage, and the percutaneous occlusion of the left atrial appendage with the Watchman system was performed without complications. After the procedure warfarin was stopped, while dual antiplatelet therapy was maintained. Control echocardiographic studies (transthoracic and transesophageal) performed after the procedure and during planned controls showed the correct position of the occluder in the left atrial appendage without residual leaks or device-related thrombi. This examination also revealed the correct position of the previously implanted MitraClip sets and moderate double-stream mitral regurgitation wave (Vc 0.6 cm). The remaining parameters were comparable to the previous study, with no improvement in LVEF which remained at the level of 20–25%.

Implantation of the cardioverter-defibrillator

Available ECG monitoring (telemetry or ECG Holter) did not reveal any complex ventricular arrhythmias. Due to the clinical picture (post-infarction cardiomyopathy, LVEF ≤ 35%, optimal medical therapy (OMT) for more than 3 months (Tab. 1), without QRS complex ≥ 130 ms), the patient was qualified for implantation of transvenous cardioverter-defibrillator (ICD) for the primary prevention of sudden cardiac death. During the next hospitalization, ICD (Medtronic Protecta VR, Medtronic 6935M–55 cm lead) was implanted in the left subclavian area. The procedure

Table 1. Optimal pharmacotherapy

Drug and dose [mg]
Aspirin 75 once daily
Ramipril 2.5 once daily
Carvedilol 25 twice daily
Furosemide 40 twice daily
Eplerenone 50 once daily
Atorvastatin 20 once daily

Table 2. Selected ESC recommendations.

Recommendations	Class	Level	References
In patients with severe secondary mitral regurgitation and LVEF < 30% who remain symptomatic despite optimal medical management (including cardiac resynchronization therapy (CRT) if indicated) and who have no option for revascularization, the Heart Team may consider a percutaneous edge-to-edge procedure or valve surgery after careful evaluation for a ventricular assist device or heart transplant according to individual patient characteristics	IIb	C	6
Left atrial appendage (LAA) occlusion may be considered for stroke prevention in patients with AF and contra-indications for long-term anticoagulant treatment (*e.g.* those with a previous life-threatening bleed without a reversible cause)	IIb	B	7–9
Primary prevention An ICD is recommended to reduce the risk of sudden death and all-cause mortality in patients with symptomatic HF (NYHA Class II–III), and an LVEF ≤ 35% despite ≥ 3 months of OMT, provided they are expected to survive substantially longer than one year with good functional status, and they have: • ischaemic heart disease (IHD) unless they have had a myocardial infarction in the prior 40 days	I	A	10–12

was carried out without any complications. The control echocardiography did not show any significant changes compared with the previous study.

Conclusions

The medical history of the patient shows the possibilities of combining OMT and modern invasive methods of treatment in cardiology. Due to the severity of the patient's disease, appropriate decisions were made regarding the time and type of advanced therapy methods according to European Society of Cardiology (ESC) guidelines (Tab. 2). This is probably one of the few patients in whom, two years after the beginning of the disease, three different percutaneous treatment methods were used with optimal results. Moreover, since the implementation of the above-mentioned methods, the patient was not hospitalized due to cardiovascular diseases. The patient is still under the control of the outpatient clinic.

Disclosure of interest

The authors declare that they have no conflict of interest.

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