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Cardiac Dyssynchrony as A Component of Decompensation in Chronic Heart Failure In The Presence Of Multiple Comorbidities: A Clinical Case

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Abstract: This paper presents a clinical case of a female patient with chronic heart failure with reduced ejection fraction (HFrEF, LVEF 28%) caused by ischemic cardiomyopathy and complete left bundle branch block (LBBB). The clinical course was complicated by arrhythmias, hypothyroidism, arterial hypertension, and signs of systemic congestion. Despite pronounced polymorbidity, temporary clinical stabilization was achieved using comprehensive guideline-directed medical therapy, including sacubitril/valsartan, β-blockers, mineralocorticoid receptor antagonists (MRAs), and SGLT2 inhibitors.

The patient objectively met all established criteria for cardiac resynchronization therapy (CRT). This case highlights the importance of a personalized, multidisciplinary approach and timely consideration of invasive treatment strategies. It also illustrates the complexity of managing chronic heart failure in patients with multiple comorbid conditions.

Keywords: chronic heart failure; ischemic cardiomyopathy; sacubitril/valsartan; cardiac resynchronization therapy; left bundle branch block.

Introduction:

Chronic heart failure (CHF) with reduced left ventricular ejection fraction (LVEF <40%) remains one of the most severe forms of cardiovascular disease. It is associated with high mortality, frequent hospitalizations, and a marked reduction in patients' quality of life. The most common underlying cause of CHF in such cases is ischemic heart disease (IHD), particularly in the presence of post-infarction cardiosclerosis [1].

Modern clinical practice increasingly encounters patients in whom CHF is combined with multiple severe comorbidities, including complete left bundle branch block (LBBB), paroxysmal atrial fibrillation, ventricular extrasystoles, severe arterial hypertension, metabolic disorders, and signs of pulmonary congestion. These conditions not only worsen the disease course but also complicate diagnosis, therapeutic decision-making, and monitoring of treatment efficacy, especially in the context of growing polymorbidity among elderly patients.

Cases in which complete LBBB is associated with a markedly reduced LVEF are of particular clinical interest, as this combination leads to intraventricular dyssynchrony and aggravates heart failure manifestations, making the patient a potential candidate for cardiac resynchronization therapy (CRT). Such situations require an individualized approach and close multidisciplinary collaboration involving cardiologists, electrophysiologists, arrhythmologists, and, in some cases, pulmonologists [2,3].

The introduction of angiotensin receptor–neprilysin inhibitors (ARNI), such as sacubitril/valsartan, has significantly expanded therapeutic options for CHF [4]. However, their use requires careful dose titration and continuous monitoring, particularly in patients with unstable hemodynamics and rhythm disturbances.

The presented clinical case is not merely a combination of common diagnoses but rather an example of complex systemic pathology with severe cardiac dysfunction, conduction abnormalities, arrhythmias, hypertension, and signs of systemic congestion. It underscores the importance of a personalized, well-reasoned approach to treatment and demonstrates the practical relevance of modern therapeutic strategies based on international guidelines.

Clinical Case

Patient B., a 62-year-old woman (date of birth: May 15, 1959), residing in the Kamashi district of the Kashkadarya region, presented in 2021 with complaints of severe dyspnea on minimal exertion, a sensation of air hunger, palpitations, lower-limb edema, generalized weakness, and markedly reduced exercise tolerance.

Her medical history revealed that she had suffered an acute myocardial infarction (AMI) in 2012, followed by the development of post-infarction cardiosclerosis. Over subsequent years, her condition progressively worsened, with multiple hospitalizations due to decompensation of chronic heart failure.

She was receiving long-term baseline therapy including sacubitril/valsartan, carvedilol, torasemide, digoxin, and warfarin. From June 2021, she noted further deterioration with increasing congestion and severe fatigue.

The patient was hospitalized on August 26, 2021, in the Department of Non-Coronary Myocardiopathies of the Republican Specialized Scientific and Practical Medical Center of Cardiology.

Admission Diagnosis

Primary diagnosis:

Ischemic heart disease. Stable angina, functional class III. Post-infarction cardiosclerosis (2012). Arterial hypertension stage III, grade 1, cardiovascular risk 4 (very high).

Complications:

Chronic heart failure stage II B, NYHA class III. Complete left bundle branch block.

Physical Examination

The patient's condition was assessed as moderately severe. Body weight: 58 kg; height: 156 cm. Respiratory rate: 20/min; SpO_2: 95%. Blood pressure: 100/70 mmHg; heart rate: 100 bpm. Cardiac auscultation revealed muffled heart sounds; moist crackles were heard over the lower lung fields. Mild bilateral lower-limb edema was present. According to the patient, urine output was preserved.

Instrumental and Laboratory Findings

- ECG: sinus tachycardia, complete LBBB.
- Echocardiography: marked dilation of the left ventricle (LVEDD 7.5 cm) and left atrium; significantly reduced LVEF (36.55%). Mitral valve area 2.8 cm^2; mitral regurgitation grade III; aortic and tricuspid regurgitation grade I.
- Holter monitoring: sinus rhythm with episodes of paroxysmal atrial fibrillation; frequent ventricular premature beats (Lown classes II–IVB).
- Abdominal ultrasound: signs of moderate hepatic congestion; renal microlithiasis.
- Chest CT: cardiomegaly with pulmonary congestion.

Laboratory tests showed significant coagulation abnormalities (INR 5.88), requiring correction of anticoagulant therapy. Lipid profile demonstrated marked hypercholesterolemia (total cholesterol 282 mg/dL, LDL-C 183 mg/dL). Glycated hemoglobin was 6.2%, consistent with controlled diabetes mellitus.

Treatment and Clinical Course

In 2021, treatment was administered according to disease severity and included:

- sacubitril/valsartan 49/51 mg twice daily,

- carvedilol 6.25 mg/day with subsequent titration,
- spironolactone, amiodarone, torasemide,
- intravenous therapy with furosemide, meldonium, cordarone, panangin, rheosorbilact, and reamberin.

Positive clinical dynamics were achieved: improvement in general condition, normalization of sleep and appetite, resolution of edema, reduction of dyspnea, and increased exercise tolerance up to 300 m on the 6-minute walk test. The patient was discharged in satisfactory condition.

Subsequent years were characterized by recurrent decompensations, progression of systolic dysfunction (LVEF declining to 28%), development of hypothyroidism, worsening ventricular arrhythmias, and repeated hospitalizations. In early 2023, empagliflozin (an SGLT2 inhibitor) was added to standard therapy, resulting in partial stabilization.

In March 2025, despite optimal guideline-directed medical therapy, the patient was hospitalized again due to severe CHF decompensation. Echocardiography showed persistently reduced LVEF (29.9%). Given the clinical presentation and instrumental findings, cardiac resynchronization therapy with defibrillator implantation (CRT-D) was recommended and successfully performed using a three-chamber device (Quadra Assura MP, Abbott) in DDD mode.

Follow-Up

Following CRT-D implantation, the patient demonstrated sustained clinical improvement: reduced dyspnea, increased 6-minute walk distance from 151 m to 300 m, decreased SHOCKS score from 12 to 6, resolution of peripheral edema, and restoration of sinus rhythm. Echocardiography at 3-month follow-up showed improvement in LVEF to 39.8%, reduced LV end-diastolic volume, and improved intraventricular synchrony. NYHA functional class improved from III to II, with significant enhancement of quality of life.

Discussion

This case demonstrates the progressive course of ischemic heart disease complicated by chronic heart failure and recurrent decompensations. Timely optimization of pharmacotherapy, including ARNI and SGLT2 inhibitors, provided temporary stabilization; however, persistent systolic dysfunction and electrical dyssynchrony necessitated invasive intervention.

According to ESC (2021) and ACC/AHA (2022) guidelines, the patient fully met criteria for CRT: LVEF ≤35%, sinus rhythm, QRS duration ≥130 ms with LBBB morphology, and persistent NYHA II–III symptoms despite optimal medical therapy. CRT implantation resulted in marked clinical and echocardiographic improvement, confirming its prognostic and therapeutic value.

Conclusion

This clinical case highlights the complexity of managing chronic heart failure in a patient with ischemic cardiomyopathy, complete LBBB, severe systolic dysfunction, arrhythmias, and multiple comorbidities. Despite modern pharmacological therapy, only partial and temporary stabilization was achieved. Successful CRT-D implantation led to significant clinical, functional, and echocardiographic improvement.

The case underscores the importance of a comprehensive, personalized approach to CHF management, timely identification of candidates for device therapy, and multidisciplinary collaboration. The first CRT-D implantation in the region represents a significant step forward in the development of advanced cardiac care and demonstrates the readiness of regional centers to implement high-technology treatments in routine clinical practice.

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