

UDC: 615.817:616.12-008.3-073.432.19

DIAGNOSIS AND CHOICE OF THE MANAGEMENT STRATEGY IN PATIENT WITH CARDIAC RESYNCHRONIZATION THERAPY IN CASE OF CHRONIC HEART FAILURE WITH MULTIMORBIDITY

D. G. Drokin¹, A. O. Parfonova¹, I. V. Shanina¹, D. E. Volkov², N. V. Lysenko¹

¹ V.N. Karazin Kharkiv National University, School of Medicine, Internal Medicine Department, Ukraine

² SI «Zaycev V. T. Institute of General and Emergency Surgery NAMS of Ukraine», Kharkiv, Ukraine

The importance of correct diagnosis and appropriate treatment is illustrated by the example of a clinical case in patient with multimorbidity. The diagnosis was confirmed in accordance with the modern diagnostic criteria and classifications. The pacemaker with dislocated electrode was replaced and cardiac resynchronization therapy device was implanted because of chronic heart failure with medical therapy optimization.

KEY WORDS: chronic heart failure, cardiac resynchronization therapy, multimorbidity

ВСТАНОВЛЕННЯ ДІАГНОЗУ І ВИБІР ТАКТИКИ ВЕДЕННЯ ПАЦІЄНТА З ІМПЛАНТОВАНИМ КАРДІОРЕСІНХРОНІЗУЮЧИМ ПРИСТРОЄМ З ПРИВОДУ ХРОНІЧНОЇ СЕРЦЕВОЇ НЕДОСТАТНОСТІ В УМОВАХ МУЛЬТИМОРБІДНОСТІ

Д. Г. Дрокін¹, А. О. Парфьонова¹, І. В. Шаніна¹, Д. Є. Волков², Н. В. Лисенко¹

¹ Харківський національний університет імені В. Н. Каразіна, Україна

² ДУ «Інститут загальної та невідкладної хірургії імені В.Т. Зайцева НАМН України», м. Харків, Україна

На прикладі клінічного випадку проілюстрована значущість постановки вірного діагнозу і проведення адекватного лікування у пацієнтів з мультиморбідною патологією. У пацієнта уточнюється діагноз у відповідності з діючими критеріями діагностики та класифікаціями, замінюється електрокардіостимулятор з електродом, що дислокувався на пристрій для кардіоресинхронізації і зв'язку з хронічною серцевою недостатністю і оптимізується медикаментозна терапія.

КЛЮЧОВІ СЛОВА: хронічна серцева недостатність, кардіоресинхронізувальна терапія, синдром преекзитації, мультиморбідність

ПОСТАНОВКА ДИАГНОЗА И ВЫБОР ТАКТИКИ ВЕДЕНИЯ ПАЦИЕНТА С ИМПЛАНТИРОВАННЫМ КАРДИОРЕСИНХРОНИЗИРУЮЩИМ УСТРОЙСТВОМ ПО ПОВОДУ ХРОНИЧЕСКОЙ СЕРДЕЧНОЙ НЕДОСТАТОЧНОСТИ В УСЛОВИЯХ МУЛЬТИМОРБИДНОСТИ

Д. Г. Дрокин¹, А. А. Парфенова¹, И. В. Шанина¹, Д. Е. Волков², Н. В. Лысенко¹

¹ Харьковский национальный университет имени В. Н. Каразина, Украина

² ГУ «Институт общей и неотложной хирургии имени В.Т. Зайцева НАМН Украины», г. Харьков, Украина

На примере клинического случая показана значимость постановки правильного диагноза и проведения адекватного лечения у пациентов с мультиморбидной патологией. У пациента уточняется диагноз в соответствии с действующими критериями диагностики и классификациями, заменяется электрокардиостимулятор с дислоцированным электродом на кардиоресинхронизирующее устройство в связи с хронической сердечной недостаточностью и оптимизируется медикаментозная терапия.

КЛЮЧЕВЫЕ СЛОВА: хроническая сердечная недостаточность, кардиоресинхронизирующая терапия, синдром преекзитации, мультиморбидность

Cardiac resynchronization therapy (CRT) is a firmly established method for treatment of

chronic heart failure (CHF). In accordance with the recommendations [1, 2], CRT is

indicated in patients with left ventricle ejection fraction (EF) $\leq 35\%$, QRS ≥ 120 ms and FC III-IV CHF, who are undergoing optimal medical therapy without any positive effect. The recommendations, however, do not take into account multimorbidity factors which can affect the pharmacological strategy after cardiac resynchronization therapy device implantation [1, 3, 4].

This clinical case represents the full range of diagnostic and therapeutic applications.

Our patient was 62 years old male, chief specialist in the sphere of energy. Diagnosis of the establishment which had directed was the following:

Primary: Dilated cardiomyopathy (DCM). Secondary pulmonary hypertension syndrome. Hypertensive heart disease, degree II, stage 2, high cardiovascular risk. Mitral and tricuspid valves relative failure. CHF II B, FC III (with reduced left ventricular function (EF – 17 %)). Status after implantation of cardiac resynchronization DDD (RV) pacing. Dislocation of left ventricular electrode.

Comorbidities: Chronic obstructive pulmonary disease (COPD). Gout, gouty arthritis, remission stage. Ankylosing spondylitis, central form, clinical stage III, FC II.

On admission, the patient complained of general weakness, decreased working ability, dyspnea with non-significant physical exertion (climbing on the second floor, walking about 500 m) – that grows in horizontal position, especially at night; of cough with scanty white sputum at night, feet and legs pastosity, pain in the left first metatarsophalangeal joint with the swelling and redness, lower thoracic and lumbar spine pain and restriction, crunch during movements, especially just after a state of rest and at night, morning stiffness; with weight loss being 20 kg (May-August 2013) due to severe distress, and further rapid weight gain becoming 7 kg in September-October 2013.

THE HISTORY OF THE DISEASE

The patient has been feeling sick since February 2002, when angina was diagnosed. He took the following medications: aspirin, nitroglycerin, atenolol, nadroparin calcium.

In April 2007 the condition of the patient deteriorated. Echocardiography: Calcification of posterior flap of the aortic valve with its limited mobility (perhaps because of the

nature of atherosclerotic transferred valvulitis). The slight acceleration of blood flow in the aortic valve, aortic valve regurgitation, degree 2. Dilatation of left heart chambers. The relative failure of the mitral valve, degree 2. The relative failure of tricuspid and pulmonary valves. Diffuse decrease in contractile function of the left ventricular myocardium, postcapillary pulmonary hypertension, degree 1. Echo features of the aortic defect. Cardiomyopathy. The therapy was the following: aspirin, captopril, carvedilol, indapamide.

In April 2009, the therapy was made again by the medical establishment. Drug therapy included: ivabradine, spironolactone, torasemide, ramipril, enoxaparin sodium.

In March 2010, the diagnosis was the following:

Dilated cardiomyopathy of unknown etiology. Secondary pulmonary hypertension syndrome. Hypertensive heart disease, degree II. CHF II B, FC IV (with reduced left ventricular systolic function (EF – 23 %)), with acute left ventricular failure attacks. Bilateral pleural effusion. Therapy: ivabradine, spironolactone, ramipril, apixaban.

In September 2012, the diagnosis included:

Small ischemic stroke in the vertebralbasilar pool with atactic-vestibular syndrome, left-sided pyramidal insufficiency. Cerebral atherosclerosis. Encephalopathy, degree II. Coronary heart disease (CHD). Ischemic dilated cardiomyopathy. Left bundle branch block. CHF II A (with left ventricular systolic dysfunction (EF – 23 %)), QRS complex 160 ms, refractory to medical therapy, the negative dynamics of echocardiography, the presence of cardiac dyssynchrony echocardiography markers. Cardiac resynchronization therapy device implantation was recommended. Therapy: crystalloid plasma, L-lysine, citicoline, actovegin, heparin, metoclopramide, dexamethasone.

In October 2012, pacemaker implantation (Medtronic Vitatron) in DDD (RV) mode was made. The electrode localization was the following: atrial – in the right atrial, right ventricular electrode – interventricular septum, left ventricular electrode – a side wall of the left ventricle. Therapy: cefuroxime, ramipril, furosemide, spironolactone. After pacemaker implantation, QRS complex duration was 120 ms, EF – 32 %.

In June 2013, the patient was hospitalized into cardiological department with complains of dyspnea, decreasing exercise tolerance. Chest X-ray – dislocation of left ventricular electrode. QRS – 138 ms, EF – 17 %.

The patient was transferred to the cardiothoracic surgical department of the SI «Zaytsev V.T. Institute of General and Emergency Surgery NAMS of Ukraine», for the surgery – replacement pacemaker and cardiac resynchronization therapy. The device was disconnected.

LIFE HISTORY

Gout, gouty arthritis, activity 0, since 2007 (allopurinol 100 mg/day).

Ankylosing spondylitis, central form, activity 0. FJI III, since 2008.

COPD. Chronic obstructive bronchitis. PF, stage 1, since 2013.

Diabetes, infectious disease, rheumatism, tuberculosis, sexually transmitted diseases are denied.

Smoking, alcohol abuse, taking drugs are denied.

Allergic history is not burdened.

ADMISSION OBJECTIVE STATUS

The patient's general condition is characterized as of an average severity. Consciousness is clear. Skin is pale. During percussion lungs border were normal. Lungs auscultation – a weakened vesicular breathing. Cardiac percussion – border of the relative cardiac dullness is extended: the right – in the i/c space III to 1.5 cm outside of L. parasternalis dextra, left – in the i/c space V to 1.5 cm outside on L. clavicularis media, upper – in i/c space III on L. parasternalis sinister. Heart sounds are rhythmic, muffled at all points of auscultation. Tone I weakened at the top. Tone II strengthened on the aorta and the pulmonary artery. Systolic murmur at the apex. Heart rate (HR) = pulse = 52 beats / min. BP – 110/70 mm Hg on both hands. Abdomen was soft and painless in all regions during palpation. The liver enlarged for 2 cm under the costal margin, the spleen not palpable. Kurlov's liver dimensions 11 cm x 10 cm x 9 cm. Legs and feet with peripheral edema. Negative sign of a beating from both sides. Normal stool and urine output.

THE LABORATORY STUDIES

Complete blood count and urinalysis within the physiological range.

Biochemical analysis of blood: total bilirubin (41,9 mmol/l), direct bilirubin (13,5 mmol/l), urea (18,7 mmol/l), creatinine (0,204 mmol/l), ALT (72,174 U/L) were increased.

Coagulation: recalcification time was increased to 130 seconds.

THE INSTRUMENTAL METHODS

Chest X-ray (09.10.2013): transparent tissue of the lungs, pulmonary diffuse pattern is strengthened by the veins, the roots are not changed, sinuses are free, heart was expanded in diameter at the expense of the left atrium and ventricle, aortosclerosis.

ECG (11.10.2013): sinus rhythm, regular, LBBB, heart rate = 62 beats / min, QRS = 138 ms.

Echocardiography (11.10.2013): sclerotic changes in the aorta, dilatation of the left and right atrial cavity, marked hypertrophy of the left ventricle, moderate pulmonary hypertension, a small aortic and mitral valves, the electrodes in the right cavities of the heart. LV systolic dysfunction. EF – 17 %.

Ultrasonography of the abdomen (11.10.2013): indirect signs of stagnation in the systemic circulation. Free fluid in the abdominal cavity.

The main clinical symptoms are:

- combined heart defect
- arterial hypertension
- congestive heart failure
- cardiomegaly
- encephalopathy
- cytolysis
- cholestasis
- articular syndrome
- left ventricular electrode dislocation

THE DIAGNOSIS

Diagnostic criteria for dilated cardiomyopathy (L. Mestroni, 1992) [5]: the patient has criteria that exclude this pathology: arterial hypertension (systolic blood pressure >160 mm Hg and diastolic blood pressure 100 mm Hg), documented and confirmed by repeated measures and/or the presence of organ – target coronary artery disease, systemic disease (gout).

Classification of hypertension by blood pressure level [6]: hypertension, degree 2 (systolic blood pressure (SBP) 160-179 mm Hg and diastolic blood pressure (DBP) 100-109 mm Hg), very high risk due to organ damage (minor ischemic stroke, 2012), stage III (small ischemic stroke, 2012).

Classification of chronic heart failure [7]: stage III – final, dystrophic circulatory failure, severe hemodynamic instability, persistent changes in metabolism and function of irreversible changes in the structure of tissues and organs, III FC – significant limitation of physical activity, systolic dysfunction of the left ventricular ejection fraction of 40 % or less.

Among the characteristic clinical and laboratory parameters for the COPD, the patient has only cough, dyspnea, decreased exercise tolerance. These complaints developed as a result of stagnation in the vessels of the pulmonary circulation on the background of chronic heart failure. Hence there is no reason to confirm the diagnosis of COPD [8].

Ankylosing spondylitis. Roman diagnostic criteria (International Congress, 1961, Rome) [9] – there are 2 diagnostic criteria of 6, which is not enough to confirm this diagnosis.

Criteria for diagnosis of gout (SL Wallace et al., 1977) [10] – 6 of 12 diagnostic criteria allowing a large base suspected gout.

Clinical classification of gout (Institute of Rheumatology, 1995) [10]: primary gout, gouty arthritis, intermittent flow with the defeat of the left first metatarsophalangeal joint. Activity 0. Functional joint insufficiency (FJI) 0.

Criteria for diagnosis of osteoarthritis of the American Rheumatism Association (New York, 1995) [11] – 5 of 10 diagnostic criteria which allow establishing the likely osteoarthritis.

Clinical classification of osteoarthritis (recommended by the Association of Rheumatology Ukraine, 2000) [12]. The secondary osteoarthritis. Osteochondrosis of the lower thoracic and lumbar spine. FJI 0.

CLINICAL DIAGNOSIS

Primary: Atherosclerosis of the aorta, cerebral arteriosclerosis.

Complication: Combined aortic defect with predominance of the disease (degree 2), relative mitral insufficiency (degree 2), tricuspid valve, the relative pulmonary valve

insufficiency. Arterial hypertension stage III, degree 2, very high cardiovascular risk. Cardiomegaly. CHF III stage, FC III (with reduced left ventricular systolic function (EF=17 %)). Small ischemic stroke in the vertebral-basilar pool with atactic-vestibular syndrome, left-sided pyramidal insufficiency (2012). Encephalopathy, degree II. Status after implantation of cardiac resynchronization DDD (RV) pacing device. Dislocation of left ventricular electrode.

Comorbidities: Gout, gouty arthritis, intermittent flow with the defeat of the left first metatarsophalangeal joint. Activity 0. Secondary osteoarthritis. Lower thoracic and lumbar spine osteochondrosis. FJI 0.

MEDICAL ADVICE

Further examination: lipidogram, Nechyporenkos' urine test, ophthalmologist consultation, thoracic and lumbar spine X-ray, radiographs of the left first metatarsophalangeal joint, monitoring of the blood uric acid level.

THE TREATMENT PLAN

Interventional procedure

Replacing of DDD (RV) pacemaker by the cardiac resynchronization device was carried out (21.10.2013): atrial and right ventricular electrode were located on the previous sites, left ventricular electrode was replaced on the vein of smaller diameter. Characteristics of pacemaker (Medtronic Consulta CRT-P): synchronous atrio-ventricular pacing, QRS 126 ms, the lower HR limit was 55 beats/minute, the top HR limit – 130 beats/minute, the AV delay was 180 ms, VV delay was 20 ms, the atrial electrode was unipolar, left ventricular – multipolar (LV tip – LV ring).

The condition of patient improved after pacemaker replacement. ECG (23.10.2013) bipolar stimulation was detected, QRS 126 ms, on echocardiography (23.10.2013) EF – 25 %.

Therapeutic interventions

Lifestyle modification: restriction of salt and fat intake (especially animal fats), increasing the consumption of fruits, vegetables, protein in the diet, regular physical activity (30 minutes, 5–7 days a week).

DRUG THERAPY ADVICE

- cancellation of torasemide, valsartan, procoralan, trimetazidine dihydrochloride

- appointment of bisoprolol 5 mg in the morning, spironolactone 50 mg in the morning, lisinopril 2.5 mg at night, atorvastatin 20 mg/day, allopurinol 100 mg/day, non-steroidal anti-inflammatory drugs topically (patch, ointment, gel diclofenac sodium).

Findings

- multimorbidity is aggravating factor for diagnosis, course and treatment of the underlying disease, which is clearly shown by this clinical case.

- cardiac resynchronization therapy reduces the severity of chronic heart failure, improves the patient's quality of life, makes the addition, but does not substitute medical treatment, which should be tailored according to the patient's overall health and the information about multimorbidity.

- the doctor does not treat the disease, but does treat the patient.

REFERENCES

1. van Weel C., Schellevis F.G. Comorbidity and guidelines: conflicting interests // *Lancet*. – 2006. – Vol. 367. – P.550–551.
2. ACCF/HRS/AHA/ASE/HFSA/SCAI/SCCT/SCMR 2013 Appropriate Use Criteria for Implantable Cardioverter-Defibrillators and Cardiac Resynchronization Therapy // *Heart Rhythm*. – Vol. 10, № 4. – P. 11–58.
3. Revishvili A.S. Serdechnaya resinkhroniziruyushchaya terapiya v lechenii khronicheskoy serdechnoy nedostatochnosti / Revishvili A.S., N.M.Neminushchiy // *NTS SSKH im.A.N. Bakuleva RAMN, Moskva, Rossiya*. – Vestnik aritmologii. – 2007. №48. – S. 47–57.
4. Ukrayins'kyy kardiologichnyy zhurnal. Dodatok 1/2013. Rekomendatsiyi z diahnostryky ta likuvannya khronichnoyi sertsevoyi nedostatnosti. – K. TOV «Chetverta khvylya», 2013. – 43 s.
5. Sumarokov A.V., Moiseyev BC, Shelepin A.A., Styazhkin V.YU. Kardiomiopatiya, miokardit, alkogol'noye porazheniye serdtsa. *Ter. arkh.* – 1984;9:37-46.
6. 2013 ESH/ESC Guidelines for the management of arterial hypertension // *Journal of Hypertension* 2013, 31. – P. 1281–1357.
7. ACCF/AHA 2013 Guideline for the Management of Heart Failure // *Circulation*, 2013. – 128. – P. 240–327.
8. Nakaz Ministerstva okhorony zdorov'ya №128 vid 19.03.2007. «Pro zatverdzhennya klinichnykh protokoliv nadannya medychnoyi dopomohy za spetsial'nistyuu «Pul'monolohiya» — Kyiv: MOZ Ukrayiny, 2007. — 20 s.
9. Dougados M., Van der Linden S., Juhlin R. et al. The European Spondylarthropathy Study Group: preliminary criteria for the classification of spondylarthropathy // *Arthritis Rheum.* – 1991. – Vol. 34. – P. 1218.
10. Wallace S.L., Robinson H., Masi A.T. et al. Preliminary criteria for the classification of the acute arthritis of gout // *Arthritis Rheum.* – 1977. – 20. – P. 895–900
11. Bierma-Zeinstra S., Bohnen A., Ginai A. et al. Validity of American College of Rheumatology criteria for diagnosing hip osteoarthritis in primary care research // *J. Rheumatol.* 2003. Vol. 26. N 5. P. 1129–1133.
12. Nomenklatura, klasyfikatsiya, kryteriyi diahnostryky ta prohramy likuvannya revmatychnykh khvorob / [Kovalenko V.M., Shuba N.M., H.V. Hayko ta in.]; Za red. V.M. Kovalenka, N.M. Shuby. — K.: Zovnishtorhvydav Ukrayiny, 2004. — 156 s.