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General Characteristic of Patients with Heart Failure of Ischemic Genesis, Their Treatment and Outcomes: 2-years Case-Control Observational Study

Sergiy Fedorov *¹, Liubomyr Glushko ¹

1. Department of Therapy and Family Medicine of Postgraduate Faculty, SHEE “Ivano-Frankivsk National Medical University”, Ivano-Frankivsk, Ukraine
[Email: serfed@i.ua]

Heart failure is a major cause of serious morbidity and death in the population and one of the leading medical causes of hospitalization among people aged greater than 60 years. The purpose of our study was to investigate general characteristic of patients with of HF of ischemic genesis and discovered the outcomes. 35 patients with HF and 30 practically healthy persons were observed. Patients with HF of ischemic genesis are patient of high cardiovascular risk. Some risk factors commit additional adverse influence for cardiovascular health. High WBC and lymphocytes counts are sign of chronic inflammation. During 2 years of observation 3 patients were died: in 2 cases it was death from cardiac events (repeat MI). In 4 cases we observed hospitalization due new diagnosis of MI.

Keyword: heart failure, coronary artery disease, outcomes

1. Introduction

Heart failure (HF) is a complex clinical syndrome that can result from any structural or functional cardiac disorder that impairs the ability of the ventricle to fill with or eject blood. The cardiac manifestations of HF are dyspnea and fatigue, which may limit exercise tolerance, and fluid retention, which may lead to pulmonary congestion and peripheral edema. HF is a leading cause of morbidity and mortality in industrialized countries ^[1]. Approximately 1–2% of the adult population in developed countries has HF, with the prevalence rising to $\geq 10\%$ among persons 70 years of age or older ^[2]. HF is also a growing public health problem, mainly because of aging populations and the increase in the prevalence of HF in the elderly. The clinical characteristics, treatment and outcomes of these patients have been well described by a number of hospital-

based registries performed in the United States of America, Europe and other countries.

Most patients with HF are managed not only by hospital cardiologists but also by primary healthcare physicians (general practitioners). Accordingly, primary care physicians must play a key role in the identification and management for these patients. The diagnosis of HF must based on following data (see table.1). There have been small quantities of studies reported that provide information on the characteristics, treatment and outcomes in this setting in city of Ivano-Frankivsk (West Ukraine). Its known, that coronary artery disease (CAD) is the cause of approximately two-thirds of cases of systolic HF, although hypertension and diabetes are probable contributing factors in many cases ^[3].

The purpose of our study was to investigate general characteristic of patients with of HF of ischemic genesis and discovered the outcomes.

Table 1: The diagnosis of heart failure (ESC, 2012)

HF with reduced ejection fraction	HF with preserved ejection fraction
1. Typical symptoms of HF	1. Typical symptoms of HF
2. Typical signs of HF	2. Typical signs of HF
3. Reduced ejection fraction of left ventricle	3. Normal or only mildly reduced ejection fraction of left ventricle and LV not dilated
	4. Relevant structural heart disease (LV hypertrophy / left atrium enlargement), and/or diastolic dysfunction

2. Materials and Methods

This trial is a case-control observation study designed to compile a clinical database on the characteristics, treatment and outcomes of the outpatients with HF of ischemic genesis. 35 patients with HF and 30 practically healthy persons were observed. The presence of HF was confirmed due the guideline of European Society of Cardiology, 2012 ^[4]. For each case, baseline data recorded on the form included:

- (1) demography including age and sex;
- (2) underlying causes of HF;
- (3) risk factors;
- (4) physical examination;
- (5) medication; ECG;
- (6) EchoCG;
- (7) general blood test;
- (8) blood biochemistry (glucose, creatinine, sodium, potassium); and
- (9) lipidogramme.

The status of all patients was surveyed and the following information was obtained:

- (1) cases of new CAD destabilization (myocardial infarction (MI) or unstable angina);
- (2) their cause of death; and
- (3) hospital admissions due to an exacerbation of HF that required more than continuation of their usual therapy on admission. The cause of death was classified as cardiac or non-cardiac death. Death from cardiac causes was defined as death due to cardiac events including sudden cardiac death, fatal myocardial infarction and HF death. Death from causes other than cardiac diseases such as cancer was defined as non-cardiac death. Ischemic heart disease was considered an etiology of HF the patient had one of the following:

- (1) a documented history of MI, angina or prior coronary revascularization;
- (2) pathologic Q waves on the electrocardiogram;
- (3) greater than 75% stenosis in one or more coronary arteries on coronary angiograms. All involved patients received the following treatment of HF (diuretic (in case of fluid retention), beta-blocker, RAAS inhibitor, low doses of acetylsalicylic acid or clopidogrel, and statin).

The protocol was approved by the local ethics committee of Ivano-Frankivsk National Medical University. Informed consent was attained for each patient. Statistical analysis was provided by *Statistica 6* software.

3. Results and Discussion

The mean age of all observed patients with HF was 64.60±6.83 years, and 7 of them were in age > 70 years (20%). Overall, 85.71% were men and 14.29% women (table. 2). In all cases the main reason of HF was CAD. All patients had angina: in 5 cases we diagnosed of II FC (CCS), in rest – III FC (CCS). All patients had MI in anamnesis: nSTEMI–11.43%, STEMI–88.57%. 10 persons had 2 MI, one of them– 3 MI. The main term from previous MI is 6.06±3.73 years. We also observed some concomitant conditions that have influence for cardiovascular prognosis: arterial hypertension (in 34 patients), 2 type diabetes (37.14%), chronic kidney disease (34.29%), peripheral atherosclerosis (in 3 persons) etc.

In accordance of 4th edition of ESC guideline for cardiovascular prevention, all patients with current or previous MI are the patients of very high cardiovascular risk ^[5]. But some other risk factors have burden influence into quality and duration of patients with HF life (table 3).

The mean body-mass index (BMI) was 29.79±5.38 kg/m². 54.29% patients had overweight, 31.43% - I grade of obesity and 8.57% of them – II grade of obesity. The mean waist circumference in males was 100.77±9.43 cm, in females - 104.10±10.77 cm. The majority of observed patients with HF had central type of

obesity: 100% of females and 74.29% of males. The increasing prevalence of obesity is a major public health problem worldwide. Obesity, especially central type, is associated with diabetes mellitus and cardiovascular diseases (CVD) such as ischemic heart disease and stroke, as well as major risk factors for metabolic disorders [6-1].

Table 2: General characteristic of patient with HF

Sign	Absolute	%
Age, years	64.60±6.83	
Males	30	85.71
Females	5	14.29
Stable Angina, FC II, CCS	5	14.29
Stable Angina, FC III, CCS	30	85.71
Previous nSTEMI	4	11.43
Previous STEMI	31	88.57
2 MI in anamnesis	10	38.57
3 MI in anamnesis	1	2.86
Arterial hypertension	34	97.14
Diabetes Mellitus, 2 type	13	37.14
Chronic Kidney Disease	12	34.29
Peripheral atherosclerosis	3	8.57
Stroke in anamnesis	2	5.72

Table 3: Additional cardiovascular risk factors

Sign	Absolute	%
BMI, kg/m ²	29.79±5.38	
Overweight	19	54.29
Obesity I grade	11	31.43
Obesity II grade	3	8.57
WC, cm (males)	100.77±9.43	
WC, cm (females)	104.10±10.77	
HR, bpm	80.97±5.72	
SBP, mm Hg	136.20±9.66	
DBP, mm Hg	85.17±7.20	
Smokers	5	14.29
Stopped of smoking	14	40
Never smoking	16	45.71

Remarks: BMI – body-mass index; WC – waist circumference; HR – heart rate; SBP – systolic blood pressure; DBP – diastolic blood pressure

The mean of heart rate (HR) was 80.97±5.72 bpm. Numerous experimental studies have shown that elevated heart rate triggers most episodes of myocardial ischemia [7]. Data published in the early 1990s gathered by the Angina and Silent Ischemia Study (ASIS) Group from a sample of 50 coronary artery disease (CAD) patients treated with a β -blocker, calcium channel blocker, or placebo, suggest that most episodes of

ambulatory ischemia (>80%) are associated with preceding increases in heart rate, and that the likelihood of ischemia development is directly related to baseline resting heart rate. Myocardial ischemia was more than twice as likely in patients with a baseline heart rate of ≥ 80 beats per minute (bpm) rather than <60 bpm, and the anti-ischemic activity of each type of medication was related chiefly to each drug’s ability to reduce heart rate [7].

The mean value of blood pressure was in normal range: 136.20±9.66 mm Hg (SBP), 85.17±7.20 mm Hg (DBP). 5 patients with HF are current active smokers. Smoking is estimated to cause nearly 10 percent of CVD and is the second leading cause of CVD, after high blood pressure¹⁸. The impact of tobacco smoke is not confined solely to smokers. Nearly 6 million people die from tobacco use or exposure to secondhand smoke, accounting for 6 per cent of female and 12 per cent of male deaths worldwide, every year. By 2030 tobacco-related deaths are projected to increase to more than 8 million deaths a year [8]. Analysis of ECG didn't show any deviations in main parameters (PR and QT intervals, complex

QRS) (table 4). Except scar changes (pathological Q- or QS-wave), left ventricle hypertrophy (in 34 cases), in 28.57% cases the left bundle branch block were observed.

According to EchoCG examination, in 7 cases (20%) the systolic dysfunction of left ventricle was established.

The results of general test (table. 5) showed significant more white blood cells (WBC) count in case of present of HF compared control group: 6.55±2.09 G/l vs 5.49±0.33 G/l (p<0,01). Similarly we founded changes in lymphocyte quantity: 2.03±0.78 G/l vs 1.41±0.17 G/l (p<0,01).

Table 4: Electrocardiogram data in patients with ischemic HF

Parameter	Value
HR, bmp	78.66±5.34
PR, msec	171.29±18.92
QRS, msec	90.57±15.23
QT, msec	377.43±21.97

Table 5: Blood test results in patients with HF

Parameter	Results
RBC, T/l	4.96±0.36
Hemoglobin, g/l	143.40±12.83
WBC, G/l	6.55±2.09
Lymphocytes, G/l	2.03±0.78
Monocytes, G/l	0.39±0.16
Segment neutrophils, G/l	3.65±1.53

Remarks: RBC–red blood cells; WBC–white blood cells

The many studies demonstrated that a WBC count was associated with an increased risk for developing CAD, or for the re-occurrence of myocardial ischemia¹⁹. WBC level above 6,900 cells/mm³ was associated with a ~2-fold increase in the risk for CAD with a significant 17.4% increase in CAD incidence observed for every increment of 1,000 WBC/mm³¹⁹.

We founded the significant difference in levels of triglycerides (TG): 1.78±1.44 mmol/l in observed

patients vs 0.70±0.42 mmol/l in control group (p<0,05), and in levels of high density lipoproteins cholesterol (HDL-C): 1.15±0.39 mmol/l vs 1.45±0.55 mmol/l. But in general, any patient had target serum level of low density lipoproteins cholesterol (LDL-C) less 1.8 mmol/ (table 6)¹⁵. The levels of potassium, sodium and creatinine were in normal range. The concentration of glucose was higher in patients with diabetes mellitus and some persons with obesity (fig 1).

Table 6: Blood biochemistry and lipidogramme results in patients with HF

Parameter	Results
Sodium, mmol/l	142.83±2.01
Potassium, mmol/l	4.61±0.49
Glucose, mmol/l	7.39±3.67
Creatinine, µmol/l (males)	98.43±20.25
Creatinine, µmol/l (females)	79.20±12.19
Total cholesterol, mmol/l	4.71±1.27
TG, mmol/l	1.78±1.44
HDL-C, mmol/l	1.15±0.39
LDL-C, mmol/l	2.74±1.01

Remarks: TG – triglycerides; HDL-C – high density lipoproteins; LDL-C – low density lipoproteins

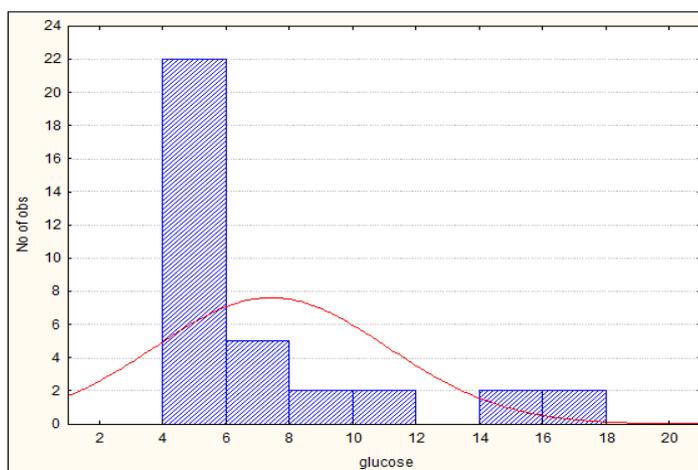


Fig 1: The plasma glucose level in patients with HF

The direct middle correlation between HR and WBC count ($r=0.38$, $p<0,5$), and HR and segment neutrophils ($r=0.36$, $p<0,5$) were established. Similar correlation between potassium level and lymphocyte count was founded ($r=0.41$, $p<0,5$). During 2 years of observation 3 patients were died: in 2 cases it was death from cardiac events (repeat MI). In 4 cases we observed hospitalization due new diagnosis of MI.

4. Conclusions

Patients with HF of ischemic genesis are patient of high cardiovascular risk. Some risk factors commit additional adverse influence for cardiovascular health. High WBC and lymphocytes counts are sign of chronic inflammation.

5. References

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