Prognostic Value of Ejection Fraction in Patients Admitted with Non-ST-Segment Elevatin Myocardial Infarction

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Despite the progress in correcting cardiovascular risk factors and pharmacological and interventional therapy, acute myocardial infarction continues to be a major cause of mortality and morbidity worldwide.In literature exist limited information about the factors that affect the outcomes of acute myocardial infarction at patients with a different degree of left ventricular dysfunction. Our aim was to identify the factors associated with LV ejection fraction (LVEF) at first admission to patients with non-ST-segment elevation myocardial infarction.

Key words: left ventricle ejection fraction, non-ST-segment elevation myocardial infarction, risk assessment

Echocardiography represents the imaging method of choice for assessing ventricular function in patients with clinical cardiac disease [1-6]. The multiple advantages are: echocardiography in emergency conditions, at hemodynamically unstable patients, it has good accuracy and is noninvasive and provides decisive information for diagnosis, risk stratification, therapeutic decision and follow-up of treatment effects.

Assessment of left ventricular function is an essential component of the echocardiographic examination. According to the literature, the assessment of the left ventricle global systolic function through the ejection fraction (LVEF) allows the differentiation of patients in three categories: patients with LVEF preserve (e" 50%), patients with reduced LVEF (typically d" 40%) and patients with intermediate FEVS (40-50%) [1]. This classification may suggest particularities related to the ventricular dysfunction substrate, comorbidities, demographic findings, and therapy response of patients with non-ST-segment elevation myocardial infarction.

The left ventricular ejection fraction is the most commonly used parameter in assessing the systolic function of the left ventricle. It is calculated by dividing the beating volume to the telediastolic volume of the left ventricle: LVEF = (VTDLV - VTSLV) / VTDLV x 100. As well it is recommended to measure volumes by 2D echocardiography using the modified Simpson method or monoplan elipsoid. For the patients with a difficult echographic window, ultrasound with contrast will be used for a better endocardial view [7-11].

The diagnosis of acute coronary syndromes without ST segment elevation is established based on the presence of angina pectoris of a character different than stable angina pectoris in the absence of persistent ST segment elevation on the electrocardiogram.

The documentation of myocardial ischemia by increasing cardiac biomarkers, the emergence of new left ventricular parietal kinetics, the evidence of unstable atherosclerotic lesions in the coronary arteries are elements that support the diagnosis.

Experimental part

The aim of the study

In our study, we included patients admitted to the County Hospital of Craiova, Cardiology Department, between January 2018 and January 2018. The main criterion in our study was the certain diagnosis of non-ST-segment

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elevation myocardial infarction, which was based on the clinical examination, laboratory findings, electrocardiography data and echocardiography.

The echocardiographic examination was performed during the first day of the hospitalization, and the estimated ejection fraction was interpreted and reported by experienced cardiologists in echocardiography. All the examination was performed according to European guidelines.

The main objective of our study was to evaluate the ejection fraction of left ventricle at patients with non-ST-segment elevation myocardial infarction at admission and to correlate the prognostic consequence of its value.

Results and discussions

The left ventricular ejection fraction (LVEF) had an average of 42.51 ± 10.45 (95% CI 41.28 - 43.74) and the distribution of non-ST-segment elevation myocardial infarction cases identified more than half of the patients with LVEF of 30-49% (N = 155, 55.4%). 24 cases showed severe ejection fraction (8.6%) and only 101 of cases (36.1 %) with LVEF was found to be over 50% (fig.1).

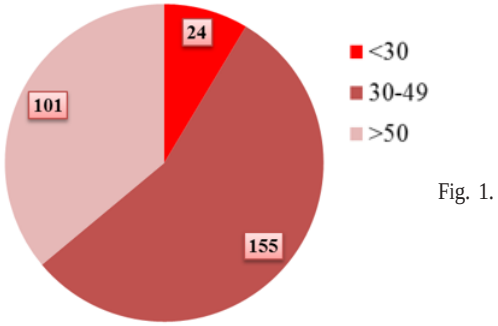

Fig. 1.

The age of patients with LVEF under 50% was 70 years of age and older, for those with LVEF below 30% (71.86 ± 10.25 years) and those with LVEF between 30-49% (70.25 ± 11.99 years) and under 70 years in those with a reasonable ejection fraction of over 50% (69.22 ± 11.91 years). A significant deterioration of FEVS with age may occur (Table 1).

Although statistically insignificant (p = 0.38), males were more severely affected by impairment of LVEF, almost 10% (9.6%, N = 15) had LVEF below 30% compared with women (7, 3%, N = 9), and those with LVEF major than 49% were less (32.7%, N = 51) than women (40.3%, N = 50).

In contrast, mean LVEF values were significantly higher (p = 0.0199) in females (44.14 ± 10.26) compared with males (41.22 ± 10.45), indicating more severe impairment of LVEF in males.

Although high BMI values had a predisposition to obesity for the NSTEMI patients from our lot, the LVEF values below 30% were more than 50% higher (p = 0.16) in obese patients of 10.6% (N = 7) compared to those without obesity 6.4% (N = 8), the impact of obesity on impairment to LVEF being know[13].

Nearly a quarter of the NSTEMI cases from our lot were exposed to smoking, to them LVEF below 30% were nearly 50% more (9.5%, N = 7) than those patients from out lot not exposed to smoking 6.5% (N = 13).

The prevalence of HBP was 85.1%, this risk factor being probably one of the most severe risk factors associated with the non-ST-segment elevation myocardial infarction.

The impact of HBP on LVEF was significant, almost 18% of HBP cases from our lot presented LVEF below 30% (N =

	% (N)	LVEF<30 % (N=24)	LVEF 30-49% (N=155)	LVEF >49% (N=101)	P
Age	(±SD)[b]	7186±10.25	70.25±11,99	69.22±11,91	0.001
Gender	Male	9.6 (15)	57.7 (90)	32.7 (51)	0.3848
	Female	7.3 (9)	52.4 (65)	40.3 (50)	
Smoking	Smoker	9.5(7)	55.4(41)	35.1(26)	0.4285
	Non Smoker	6.5 (13)	56.0 (112)	37.5 (75)	
Obesity	Positive	10.3 (16)	58.1 (90)	31.6 (49)	0.164
	Without	6.4 (8)	52.0 (65)	41.6 (52)	
History of stroke	Positive	13.6 (16)	62.7 (74)	23.7 (28)	< 0.001
	Without	4.9 (8)	50.0 (81)	45.1 (73)	
Percutaneous coronary intervention	Positive	11.8 (6)	52.9 (27)	35.3 (18)	0.054
	Without	7.9 (18)	55.9 (128)	36.2 (83)	
High blood pressure	Positive	17.9 (40)	48.7 (108)	33.3 (74)	< 0.001
	Without	7.7 (3)	56.4 (22)	35.9 (14)	
Diabetes mellitus	Positive	11.1(10)	57.8(52)	31.1(28)	0.085
	Without	7.4 (14)	54.2 (54.2%)	38.4 (75)	
Congestive heart failure	Positive	13.0 (21)	63.6 (103)	23.5 (38)	< 0.001
	Without	2.6 (3)	44.0 (51)	53.4 (62)	
Cerebral stroke	Positive	8.3 (3)	58.3 (21)	33.3 (12)	0.925
	Without	8.6 (21)	54.9 (134)	36.5% (89)	
Stent implantation	Positive	15.8 (3)	52.6 (10)	31.6 (6)	
	Without	8.0 (21)	55.6 (145)	36.4 (95)	0.027
cTni	(±SD)[a]	0.855±1.4	2.26±1.98	1.351±3.45	
Days of hospitalization	(±SD)[b]	9.42±5.14	8.43±4.27	7.26±3.47	< 0.001

[a]- p<0,01 comparative with LVEF 30-49;
[b]- p<0,01 comparative with LVEF >49;
LVEF – Left Ventricle Ejection Fraction; HBP – High bood presure;

Table 1

40) as opposed to HBP-free cases from our study where LVEF under 30% was identified in only 7 cases (7.7 %).

For patients with high blood pressure from out study, the risk of LVEF impairment below 30% was more than 2 times higher than in non-HBP patients. (RR = 2.22, 95% CI = 1.01-4.94, P = 0.0496).

In our study, patients with LVEF less than 30% were almost 3 times more often (13.6%, N = 16) than in non-stroke cases (4.9%, N = 8), and we observed a low presence of LVEF cases over 50 % in only 29 patients (23.7%) vs. 73 patients (45.1%) without history of stroke. In this context, the risk of LVEF impairment to less than 30% was 2.19 times higher in cases of patients with stroke (RR = 2.19, 95% CI 1.08-5.41, P = 0.0398).

The history of coronary heart disease as a risk factor for LVEF impairment is also supported by the higher incidence of LVEF cases below 30% in those with a personal history of coronarography (11.8%, N = 6) compared to those with no previous coronarographies (7.9%, N = 18), as well as the presence of a stent implantation associated with a double prevalence (p = 0.027) of patients with LVEF <30% (15.8%, N = 3) compared to patients without a history of percutaneous coronary intervention without stent implantation (8%, N = 21).

The LVEF decreased more than 30% was five times more frequent (p <0.001) in NSTEMI patients with congestive heart failure associated (13.6%, N = 21) compared to non-congestive heart failure cases (2.4%, N = 3), the risk of LVEF impairment less than 30% was more than 3 times higher in CHF-associated cases of patients with NSTEMI from our lot, than those patients without CHF (RR = 3.39, 95% CI 1.051-10.911, p = 0,041).Moreover, maintaining a LVEF of over 50% was over two times lower in NSTEMI patients associating CHF (23.5%, N = 38) compared to those without CHF (53.4%, N = 62).

The mean days of hospitalization required to manage NSTEMI patients with an LVEF below 30% (9.42 ± 5.14 days) were greater with 2 days (p = 0.015) and one day (p = 0.09) for those with the left ventricular ejection fraction of 30-49% (8.43 ± 4.27 days) compared to those with the LVEF over 50% (7.26 ± 3.47 days) .

Conclusions

Our results show that LVEF is a strong predictor of mortality and should be considered a part of early routine assessment and stratification of risk in patients with myocardial infarction.

Abbreviations

NSTEMI: non-ST-segment elevation myocardial infarction
LVEF : left ventricular ejection fraction
BMI: body mass index
HBP: high blood pressure
CHF: congestive heart failure

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