ISCHEMIC MITRAL REGURGITATION IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

A. O. Petris¹, D. Iliescu¹, D. M. Alexandrescu², Irina-Iuliana Costache¹
University of Medicine and Pharmacy, “Grigore T. Popa” - Iași
Faculty of Medicine
1. Discipline of Cardiology
2. Cardiovascular Diseases Institute “George I. M. Georgescu”- Iași

ECOCARDIOGRAPHIC EVALUATION OF ISCHEMIC MITRAL REGURGITATION IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION (Abstract). Aim of the study: echocardiographic evaluation of mitral regurgitation (MR) during the evolution of patients with acute myocardial infarction (MI). Material and methods: the study included 104 patients (73 males and 31 females), aged between 38-85, diagnosed with acute myocardial infarction (based on clinical, ECG and enzymatic evidences), in order to assess the MR (clinically - a new systolic murmur, and by echocardiography-the severity of MR). Echocardiography was performed upon admission and at 10-30 and 180 days after the onset of acute MI. The evaluation of MR was based on the following parameters: jet area, jet area indexed to left atrium, regurgitated volume, left atrial and left ventricular size, the evaluation of mitral valve apparatus in order to eliminate other possible causes of MR. Results and discussion: MR was found in 35 patients from 104 diagnosed with acute MI, as follows: severe in 20 patients (jet area > 8 square cm, jet area indexed to left atrium > 40%, regurgitated volume > 30 mL) and mild in 15 patients (jet area < 4 square cm, jet area indexed to left atrium < 20%, regurgitant volume < 30 mL). In 30 patients MR was produced by the dilatation of mitral annulus (because of the evolution to ischemic dilative cardiomyopathy), 5 patients developed left ventricular aneurysm; in 3 patients, MR was produced by chordae rupture and in 2 patients we diagnosed an ischemic prolapse of posterior mitral leaflet. In evolution all the patients developed symptoms and signs of heart failure, and 2 patients were referred to surgery. Conclusions: The appearance of MR in the evolution of MI is an important sign of bad prognosis by its contribution to the appearance and/or to the worsening course of heart failure. Mechanisms of this MR are very complex based on the alteration of left ventricular geometry. Echocardiography plays an essential role in the early diagnosis of MR, estimating its severity, the mechanisms and also the prognosis. Keywords: MITRAL REGURGITATION, ECHOCARDIOGRAPHY, ACUTE MYOCARDIAL INFARCTION

Chronic ischemic mitral regurgitation (IMR) is a common complication of myocardial infarction which severely affects cardiovascular mortality and morbidity (1, 3, 4). Multiple pathophysiological mechanisms are involved in generating IMR, each of them having a different importance: left ventricular (LV) remodeling and dysfunction, annular dilation/dysfunction, and mechanical dyssynchrony (2, 3, 5). The most frequent mechanism involved in the occurrence of mitral regurgitation is the presence
of local or global LV remodeling that alters the geometrical relationship between the ventricle and valve apparatus (4, 5, 6, 8). In the wide spectrum of patients with chronic IMR, the assessment of some echocardiographic parameters, such as tethering pattern, leaflet motion, origin and direction of the regurgitant jets, allows one to identify different specific subgroups of patients subjected to different therapeutic approaches (2, 5, 6, 7). The aim of medical and/or surgical therapy is to improve heart failure symptoms, and improve LV remodeling and function and the intermediate/long-term outcome. The targets of surgical MV repair involve annulus, leaflets, chordae and ventricles (9, 10, 11) The restricted annulo-plasty is the most commonly adopted surgical procedure that improves heart failure symptoms but not survival when compared to medical therapy and is also subject to a high incidence of late failure (~30%) (9, 11).

The aim of the study was to evaluate the possible mechanisms involved in the occurrence of mitral regurgitation in patients with acute myocardial infarction.

**MATERIAL AND METHODS**

The study included 104 patients, 73 (70,19%) males and 31 (29,8%) females, aged between 38-89 years, admitted to the 1st Cardiology Clinic between 2003 and 2012, diagnosed with acute myocardial infarction. All patients were admitted to the emergency unit of the hospital and they were brought by ambulance in most of the cases.

We selected in our study patients who fulfilled diagnostic criteria for acute coronary syndrome:
- clinical symptoms-angina;
- paraclinical tests: electrocardiographic ST changes associated with subendocardial or subepicardial ischemia or new left bundle branch block (LBBB) associated with high levels of myocardial cytolytic enzymes (Troponin).

Paraclinical evaluation included:
- evaluation of the risk factors: level of glucose, uric acid, lipid profile, complete blood count, coagulation tests;
- medical tests that evaluate the main organs affected by high blood pressure or/and diabetes;
- 12-lead electrocardiogram - for positive diagnosis and localization of acute coronary syndrome;
- Echocardiogram (2D, M-mode and Doppler) - to assess systolic and diastolic function of LV; regional kinetic changes, the presence of other complications (intracavitary thrombus), and in order to detect mitral regurgitation (the aim of the current study).

**RESULTS AND DISCUSSION**

The diagnosis of myocardial infarction was established by: clinical typical symptoms, electrocardiographic changes, elevation of myocardial cytolysis enzymes and in few cases-pathological confirmations. Being a major emergency, the first therapeutic measures for all patients were initiated in the emergency care unit concomitant with a cardiologic examination.

The following steps were undertaken: the anamnesis of the patient, with the mention that in the situations in which the condition of the patient did not allow the direct anamnesis, the data was obtained from his relatives or from the previous hospital release documents (patient's previous medical folder respectively).

The following aspects were investigated during the anamnesis:
- patient's cardiovascular antecedents:
high values of blood pressure (HBP), chronic ischemic disease, acute myocardial infarction (IMA), valvular heart diseases, dilated cardiomyopathy (CMD), previously known rhythm and/or conduction disorders, potential surgical interventions at the level of the cardiovascular system;

- the associated risk factors having an impact on the cardiovascular system (smoking, alcohol intake, diabetes);

- associated co morbidities (thyroid gland disorders such as hypo or hyperthyroidism, chronic obstructive bronchopneumopathy (BPCO), stroke);

- treatments followed at home up to the moment of coming to the emergency care unit;

- the emphasis was on identifying the precipitating and aggravating factors of the acute MI: inadequate physical effort, alcohol intake, paroxysmal rhythm disorder, conduction disorder, prolonged treatment discontinuation, excessive salt intake.

The complete examination of the patients involved: assessing the general state, consciousness, pulmonary auscultation, heart and peripheral arteries (carotid) auscultation, checking of blood pressure (BP).

All patients were monitored in the coronary intensive care unit (ECG, breaths/minute, BP, O₂ sat, diuresis).

Standard 12-lead ECG was performed on all patients immediately after admission to confirm the diagnosis of acute myocardial infarction, the localization of MI and possible arrhythmic complications.

The localization of myocardial infarction in the patients from the group was: anterior - 57 (51.92%) cases; inferior - 23 (22.11%) cases; antero-extensive - 15 (14.42%) cases; infero-lateral and right ventricular infarction - 9 (8.65%) cases (fig.1).

The analysis of the associated risk factors in the patients from the group revealed the following: of the total number of patients, 31 (29.8%) were smokers, 23 (22.11%) reported chronic alcohol consumption, dyslipidemia was present in 48 (46.15%) patients, 6 (5.76%) of them being under treatment with statin. Diabetes was present in 11 (10.57%) males and 8 (7.69%) females, 5 (26.31%) of them being under treatment with insulin; 3 (2.88%) patients had associated thyroid pathology; 4 (3.84%) of them had antecedents of stroke; 15 (14.42%) had chronic obstructive bronchopneumopathy (BPCO) and 4 (3.84%) presented chronic renal disease (fig. 2).

From all the patients 85 (81.73%) had a history of previous angina.
Ischemic mitral regurgitation in patients with acute myocardial infarction

The clinical examination was focused on the discovery of a mitral regurgitation murmur in patients with acute MI during the evolution.

After confirming mitral regurgitation by echocardiography, the following parameters were determined:
- jet area;
- jet area indexed to left atrium;
- regurgitant volume;
- left atrial and left ventricular size;
- the evaluation of mitral valve apparatus in order to eliminate other possible causes.

Echocardiography 2D, M-mode and Doppler was performed in all patients upon admission and thereafter depending on the situation, 10, 30 and 180 days after onset.

Mitral regurgitation was found in 35 (33.65%) patients from 104 diagnosed with acute MI, as follows: - severe in 20 (19.23%) patients - jet area > 8 square cm jet area indexed to left atrium > 40%, regurgitant volume > 30 mL and mild in 15 patients (14.42%) - jet area < 4 square cm, jet area indexed to left atrium < 20%, regurgitant volume < 30 mL (fig. 3).

The etiology of mitral regurgitation was also estimated by echocardiography as follows:
- in 30 (28.84%) patients echocardiography showed dilatation of mitral annulus (because of the evolution to ischemic dilative cardiomyopathy), 5 (4.80%) patients developed left ventricular apical aneurysm;
- 3 (2.88%) patients - chordae rupture;
- 2 (1.92%) patients - ischemic prolapse of posterior mitral leaflet (fig. 4).

The localization of the acute MI in patients who develop acute mitral regurgitation was:
- 25 (24%) of patients: anterior myocardial infarction;
- 5 (4.80%) patients: anterior extensive MI;
- 2 (1.92%) patients: inferior MI;
- 3 (2.88%) patients: infero-lateral MI (fig. 5).
The evolution of patients from study who developed mitral regurgitation by different mechanisms during evolution of myocardial infarction was:

- all the patients developed symptoms and signs of heart failure;
Ischemic mitral regurgitation in patients with acute myocardial infarction

- 2 (1.92%) patients were directed to cardiac surgery for valvular reconstruction;
- 2 (1.92%) patients (one female and one male) died from cardiogenic shock.

CONCLUSIONS
The appearance of MR in the evolution of myocardial infarction is an important sign of bad prognosis by its contribution to the appearance and/or to the worsening course of heart failure. Mechanisms of this MR are very complex based on the alteration of left ventricular geometry. In our study the principal mechanism was the dilatation of mitral annulus (because of the evolution to ischemic dilatative cardiomyopathy), followed by chordae rupture and ischemic prolapse of posterior mitral leaflet. Echocardiography plays an essential role in the early diagnosis of MR, estimating its severity, the mechanisms and also the prognosis.

REFERENCES