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Research Article

Conservative treatment versus invasive approach in elderly patients with myocardial infarction without ST-segment elevation

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Keywords: Elderly; Non ST myocardial infarction; Treatment; Comorbidities; Mortality

Abbreviations: AV: Atrioventricular; CABG: Coronary Artery Bypass Grafting; ECG: Electrocardiogram; GRACE Score: Global Registry of Acute Coronary Events Score; LDL: Low-Density Lipoprotein; NSTEMI: Non ST Myocardial Infarction; MI: Myocardial Infarction; PCR: C-Reactive Protein

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Introduction

Myocardial infarction without ST segment elevation is one of the most common causes of hospitalization of the elderly patient [1]. Coronarography followed by revascularization, is performed in the vast majority of cases of myocardial infarction without ST segment elevation, in the regions with a well-developed health system. The decision to perform the procedure, the type of approach (early/late) and the selection of the type of myocardial revascularization depend on numerous factors such as: associated comorbidities, clinical presentation, the risk group in which the patient is framed, fragility, cognitive status, life expectancy etc. [2,3]. Older patients often present with various comorbidities, having a higher risk of complications and an unfavorable evolution. Thus, it was observed that invasively treatment is less commonly used in elderly patients with comorbidities, even if, the current guideline recommends that the invasive strategy should be considered in all patients with NSTEMI, regardless of age. At the same time, this subgroup of patients is not so well represented in the studies performed so far, the type of treatment chosen, being most often at the discretion of the attending physician [1,2].

Objective The present study aims to analyze the evolution of a subgroup of patients ≥ 70 years of age, with different comorbidities, with the diagnosis of myocardial infarction without ST segment elevation, according to the type of treatment applied: conservative versus invasive strategy (diagnostic coronarography ± revascularization, if appropriate).

Methods

We analyzed all cases of myocardial infarction without ST segment elevation, admitted to the Emergency County Clinical Hospital, Oradea, during the period 1.01.2017-10.06.2018. The diagnosis of myocardial infarction was established on two of the following 3 criteria: ischemia symptoms, ECG changes (except for persistent ST segment elevation and left bundle branch block) or troponin above the local laboratory reference value. We selected patients ≥ 70 years of age, with various comorbidities, who have benefited from invasive strategy or conservative treatment. We have excluded patients with myocardial infarction with ST segment elevation or unstable angina, with a life expectancy of less than 1 year, with severe valvulopathies or patients known with multivascular coronary disease without the revascularization possibilities.

For each patient we have extracted from the observation sheet: age, sex, presence of cardiovascular risk factors: smoking, dyslipidemia, hypertension; the medical history, especially the presence or absence of diabetes, old myocardial infarction, history of angioplasty or coronary aortic bypass; other comorbidities such as: anemia, chronic kidney disease, oncological pathology, cognitive disorders, sepsis; Killip class, GRACE score, HAS BLED score, left ventricular ejection fraction at admission, risk group , type of treatment (conservative or interventional) .We have followed the evolution of the patients during the hospitalization and on discharge, for a period of one year by: the number of cardiovascular deaths, the type of complications that occurred during the hospitalization and upon discharge, the rate of rehospitalization and its causes. We divided the patients in 2 groups, based on the type of the treatment: group A which included the patients who were given an invasive approach and group B that included the patients that were treated conservatively.

Statistical analyze was performed with Statistica 8.0. We used t-test for compare numerical variables, cross tabulation and chi-square test for ordinal variables, between groups. Multiple regression was used for determining the independent predictors for mortality.

Results

The study included a total of 128 patients, of whom 64 benefited from invasive strategy, representing group A and 64 were treated conservatively, representing group B. The characteristics of the 2 study groups are shown in table 1.

The reasons why patients in group B did not perform coronarography were: patients refusal to perform the procedure 23 patients (35.94%), 2 patients (3.12%) had acute renal failure at admission, 3 patients (4.68%) suffered hemorrhagic complications, 5 (9.37%) had sepsis, the infarction being considered in this case type II infarction, 1 patient (1.56%) had critical ischemia of the lower limb. In the remaining 30 cases (46.87%) the decision belonged to the treating physician.

Of the patients who received an invasive approach 14 (21.87%) had monovascular coronary disease, 13 (20.31%) were bivascular and the remaining 36 (56.25%) were multivascular.37 patients were percutaneously revascularized, the remaining 27 had indication for coronary artery bypass, which was performed in 8 cases, the rest of the patients choose to continue the maximum optimal drug treatment.

During the hospitalization, 23 (35.94%) of the patients treated conservatively developed cardiovascular complications such as acute pulmonary edema, cardiogenic shock, arrhythmias and recurrent ischemia. The same complications were encountered in a smaller proportion in the invasive group (n = 13; 20.31%) (Table2).

Table 1: Characteristics of patients included in the study.

Parameter	GroupA Invasive strategy	Group B Conservative
Age (year)	76.2187 ± 4.4274	79.1875 ± 5.44780
Sex (m)	41 (64.06%)	30 (46.87%)
Diabetis	20 (31.25%)	25 (39.06%)
History of MI	7 (10.93%)	10 (15.65%)
History of CAGB	1 (1.56%)	1 (1.56%)
History of angioplasty	7(10.93%)	4(6.25%)
Hypertension	50 (78.12%)	41 (64.06%)
Dyslipidemia	25 (39.06%)	25 (39.06)
Dementia	5 (7.81%)	10 (15.62%)
Oncological pathology	4 (6.25 %)	4 (6.25%)
Sepsis	5 (7.81%)	6 (9.37 %)
Atherosclerosis in other territories	11 (17.18%)	16 (25%)
Smoking	9 (14.06%)	8 (12.5%)
Left ventricular ejection fraction at admission (%)	44.87 ± 8.54%	4.,60 ± 8.79%
GRACE score	148.95 ± 20.05	167.29 ± 31.344
Killip class		
I	34(53.12%)	22 (34.37%)
II	23(35.94%)	29 (45.31%)
III	3(4.69%)	5 (7.81%)
IV	4(6.25%)	8 (12.5 %)
Risk groups		
Very high risk	11(17.19%)	16 (25%)
High risk	39(60.94%)	41 (64.07%)
Medium risk	14(71,87%)	7 (10.93%)
Hemoglobina (g/dl)	12.72 ± 0.90	12.67 ± 1.70
HAS BLEDscore	2.79 ± 0.90	3.09 ± 0.88
Creatinine clearance (ml/min)	63.31 ± 24.00	54.63 ± 23.898
PCR (mg/dl)	4.18 ± 7.84	6.28 ± 8.243
LDL cholesterol (mg/dl)	112.93 ± 51.92	109.53 ± 41.494
Triglycerides (mg/dl)	151.43 ± 103.89	127.76 ± 63.64

Table 2: Complications, rehospitalization and death in the two groups.

Complications		Invasive strategy		*p*
		Yes	No	
Cardiovascular		13(20.31%)	23(35.94%)	0.07
Extracardiac		16 (25%)	8(12.5%)	0.04
Hemorrhages		3(4.69%)	6(9.38%)	0.29
Rehospitalisation				
Number of hospital readmission during 1 year	1	18(28.13%)	15(23.44%)	0.71
	2	6(9.38%)	4 (6.25%)	
	3	4(6.25`	2(3.13%)	
Death				
During hospitalization		4(6.25%)	14(21.88%)	0.009
1 year mortality		22(34.38%)	12(18.75%)	0.04

Although cardiovascular complications were significantly higher in the group of patients treated conservatively, multiple regression showed that the only independent predictor of cardiac complications during hospitalization was the age of the patients (p = 0.0166) and not the invasive strategy (p = 0.059).

Other complications encountered in the conservative treatment group were: stroke, hemorrhage, acute kidney failure and acute lower limb ischemia. However, in group A, complications of the angiography procedure appeared: 6 of these patients developed post-procedural contrast

nephropathy (n = 6), lower digestive bleeding (n = 1), ischemic stroke (n = 1), high grade AV block (n = 2), malignant rhythm disorder (n = 1) and coronary dissection (n = 1).

At one year, 4 patients in Group A (6.25%) were hospitalized for digestive bleeding, while 6 patients in Group B (9.37%) were hospitalized for ischemic stroke.

Hemorrhagic complications were significantly and positively correlated with hemoglobin value (p = 0,0037) at admission and were not influenced by invasive startegy (p = 0.1012). Hospitalization due to cardiac problems at one year was similar in the 2 groups: 25 patients (39.06%) of those treated conservatively (15 patients -1 hospitalization, 6 patients -2 hospitalizations, 4 patients-3 hospitalizations), respectively 24 patients (37.5%) of those who received invasive approach (18 patients- 1 hospitalization, 4 patients -2 hospitalizations, 2 patients - 3 hospitalizations). Among the causes of hospitalization we mention: ischemia 16 cases group A versus 21 group B, heart failure 12 cases group A versus 15 group B, arrhythmias 3 in group A versus 2 group B.

The number of deaths during hospitalization was 14 (21.87%) in group B and 1 (1.56%) in group A, a similar difference being observed at one year , 22 patients (34.37%) of those treated conservatively and 12 cases (18.75%) of those treated invasively. Thus, at the first univariate analysis, the invasive strategy correlates negatively, and statistically significantly with the death rate during the hospitalization (p = 0.001) and at one year (r = -0.17, p = 0.04). However, introducing other variables in the analysis such as cardiac , haemorrhagic and other complication, laboratory parameters, existent comorbidities, multivariate regression shows that neither the death during the hospitalization nor the mortality at 1 year, are significantly influenced by the invasive approach (Tables 3,4). The independent predictors of intra-hospital death are the value of C-reactive protein upon admission, cardiac complications and other complications. While mortality at 1 year is significantly influenced only by age.

Table 3: RegressionSummary for Dependent Variable: death during hospitalisation.

R = 0.66132 R2 = 0.43734 Adjusted R2 = 0.32640 F(14.71) = 3.9420	
	p - level
age	0.393094
sepsis	0.595211
oncologic pathology	0.757357
Dementia	0.381975
creatinine clearence	0.878622
PCR value	0.003498
LDL colesterol	0.260747
Triglycerides	0.839754
HAS BLED score	0.341335
hemoglobin	0.332145
other complications	0.007385
cardiovascular complications	0.014477
hemorrhagic complications	0.390316
Invasive strategy	0.076607

Table 4: Regression Summary for Dependent Variable: 1 yearmortality.

R = 0.55011 R2 = 0.30262 Adjusted R2 = 0.16511 F(14.71) = 2.2007	
	p - level
age	0.034110
sepsis	0.989814
oncologic pathology	0.140602
dementia	0.557420
creatinine clearence	0.898438
PCR value	0.135649
LDL	0.167541
triglycerides	0.361451
HAS BLED score	0.115309
Hemoglobin	0.371086
othercomplications	0.090968
cardiac complications	0.257711
hemorrhagiccomplications	0.219153
Invasive strategy	0.067802

Discussion

Existing data in the literature on the benefits of invasive versus conservative treatment in elderly patients with myocardial infarction without ST segment elevation are inconsistent.

In our study, intra-hospital mortality and 1 year mortality was higher in the conservative treated group. The results obtained are similar to those of the study “After Eight” by Nicolai Tegn and colleagues. The study was conducted between December 10, 2010 and February 21, 2014, and included patients over 80 years old, hospitalized with myocardial infarction without ST segment elevation, but also unstable angina. In contrast to our study, 229 patients received invasive treatment and 228 conservative treatment.

The number of deaths and ischemic events was higher in the conservative treated group as in our case. In addition to the After Eight study, our research has established that PCR, cardiac and other complications are independent predictors of cardiac death during hospitalization and not invasive strategy. Also, there were no differences between the two arms regarding the bleeding complications which converges with the results obtained in our study [1,4].

Another study, conducted by Antoane Negers and co-workers, which included 141 patients aged ≥ 75 years, who were treated interventionally in proportion of 62% , showed that patients treated conservatively had intra-hospital mortality higher, however the invasive strategy did not represent an independent predictor of mortality at 6 months days, data similar to those obtained by us. The main objective of their study was to determine the factors that lead to the choice of conservative treatment. As in our research, it was observed that older patients with renal impairment, dementia and paradoxical, those with a higher GRACE score will not be approached invasively, although the current guideline recommends this [5].

The Italian elderly ACS study "was among the first study to include patients with NSTEMI, aged ≥ 75 years, who were randomized into two arms, one for invasive strategy, the other for initial conservative treatment, and in case of recurrent ischemia, the patient will perform the coronarography. The study included 313 patients, the primary endpoint consisting of: all-cause mortality, myocardial infarction, rehospitalisation, and major bleeding was reduced by the invasive strategy, only in patients who had increased troponin at admission, not in the entire population. The results of this study are different from those obtained by us, but so is the design of the study, the patients initially treated conservatively made in proportion of 30% the coronarography due to recurrent ischemia, while our comparison group included only conservative treated patients [6].

In the group studied by us the most important predictor for 1 year mortality, was the age, data obtained by Cheng Chung Wei and collaborators on a batch of 1470 patients hospitalized with the diagnosis of myocardial infarction without ST-segment elevation, patients aged 75 years, having a mortality at 90 days and one year, higher than those aged 45-64 years [7].

Information on the importance of C-reactive protein, and the impact of cardiovascular and extra cardiac complications in predicting mortality in elderly patients with NSTEMI, treated conservative or not is currently absent in the literature.

Limitations of the study

The main limitation of the study is the small number of patients included, and a larger study is needed to confirm this data. As well, patients who had multivascular coronary artery disease were not completely revascularized, a number of 19 patients (29.68%) remaining on medication, an aspect that could have contributed to the results obtained. Also, it was not included in the analysis, the patients' compliance to the treatment during the year of follow-up after myocardial infarction, which could be a confounding factor in the interpretation of the predictors of the 1-year rehospitalisation and 1-year mortality.

Conclusion

Although in the current NSTEMI guideline, age is not a deciding factor for the type of treatment applied (conservative/invasive), in reality there is a tendency to conservatively treat elderly patients, especially those who associate multiple comorbidities. Our study has shown that intra-hospital mortality, and at 1 year, in patients ≥ 70 years of age, with myocardial infarction without ST segment elevation , as well as the cardiac or hemorrhagic complications developed by them, are not statistically significantly influenced by the type of treatment applied, conservative versus invasive. The most important predictor of cardiovascular complications and short and medium term mortality was the age of the patients. Hemorrhagic complications were statistically and positively correlated with the hemoglobin level at admission. In addition, we identified that C-reactive protein, cardiovascular, and extra cardiac complications have been shown to be independent predictors of intra-hospital mortality in this category of patients. Future studies to include elderly patient, frail, with various comorbidities should be conducted to determine which approach is most effective in this patient subgroup. We aim to expand the research in the future, taking into account the issues mentioned in the study's limits section, in order to provide clarification on the best treatment option for elderly patients with NSTEMI.

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