Acute Myocardial Infarction in Patients Under 45 Years

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Introduction and objective. To evaluate the differential features of acute myocardial infarction in patients younger than 45 years old compared to older patients.

Patientes and methods. From 1995 to 1999, delays in the assistance, evaluation, and therapeutic strategies as well as complications in patients hospitalized with a diagnosis of acute myocardial infarction, have been registered in the intensive care units of the 17 hospitals participating in the PRIMVAC Register.

Results. During the study, 10,213 patients were registered, 6.8% younger than 45 years old (691 patients). Young patients show a greater prevalence of cigarette smoking (80.9 vs 34.1%; p < 0.0001) and hypercholesterolemia (39.9 vs 28.6%; p < 0.0001), whereas arterial hypertension, diabetes, and history of coronary disease were significantly more frequent in the older group. This subgroup reached the healthcare system at an earlier stage (120 vs 160 min; p < 0.0001). Thrombolysis was performed in 59.9% of patients younger than 45 years and in 45.9% of patients older than 45 years. Young patients were more frequently given aspirin (94.5%), heparin (70.6%), and beta-blocker drugs (38.4%), whereas patients older than 45 years were given a higher percentage of ACEI, digoxin, and inotropic drugs. Younger patients had a better prognosis and a lower mortality rate (3.5 vs 14%; p < 0.00001).

Conclusions. Acute myocardial infarction in patients younger than 45 years had different clinical features and responded to different therapeutic and diagnostic approaches than acute myocardial infarction in patients over 45 years, as well as a better short-term prognosis.

Key words: *Myocardial infarction. Thrombolysis. Registry.*

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Infarto agudo de miocardio en pacientes menores de 45 años

Introducción y objetivo. Evaluar las características diferenciales del infarto agudo de miocardio en el paciente joven (menor de 45 años) en relación con el paciente de mayor edad.

Pacientes y métodos. Se han recogido las características clínicas, retrasos en la asistencia, estrategias diagnósticas y terapéuticas y complicaciones de los pacientes ingresados con diagnóstico de infarto agudo de miocardio entre los años 1995 y 1999 en las unidades de cuidados intensivos de los 17 hospitales que participan en el registro PRIMVAC.

Resultados. Se han registrado 10.213 pacientes, de los cuales el 6,8% tenía una edad menor de 45 años (691 pacientes). Los pacientes jóvenes presentan una mayor prevalencia de tabaquismo (80,9 frente a 34,1%; p < 0,0001) e hipercolesterolemia (39,9 frente a 28,6%; p < 0,0001), mientras que la hipertensión arterial, la diabetes y los antecedentes de enfermedad coronaria son significativamente superiores en el grupo de mayor edad. Este subgrupo contacta antes con el sistema sanitario (120 frente a 160 min; p < 0,0001). La trombólisis se realizó en el 59,9% de los pacientes jóvenes en comparación con el 45,9% de los pacientes mayores de 45 años. Los pacientes jóvenes recibieron más frecuentemente aspirina (94,5%), heparina (70,6%) y bloqueadores beta (38,4%), mientras que la administración de IECA, digoxina e inotrópicos fue superior en los mayores de 45 años. Los pacientes jóvenes tuvieron un pronóstico mejor, con una menor mortalidad (3,5 frente a 14%; p < 0,00001).

Conclusiones. El infarto agudo de miocardio en el paciente joven presenta unas características clínicas y un tratamiento diagnóstico y terapéutico diferentes respecto al grupo de mayor edad, así como un pronóstico a corto plazo más favorable.

Palabras clave: *Infarto de miocardio. Trombólisis. Registro*.

INTRODUCTION

Epidemiological studies performed in Spain have shown an exponential increase in the ischemic cardiopathy mortality rate with respect to age.[1] In young patients (those less than 35 years of age), the main causes of death are traffic accidents, suicide, and AIDS. At age 35 years and older, heart disease is increasingly

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ABBREVIATIONS

PTA: percutaneous transluminal angioplasty
ACEI: angiotensin converting enzyme inhibitor
PRIMVAC: Proyecto de Registro de Infarto Agudo de miocardio de Valencia, Alicante y Castellón (Project for Registry of Acute Myocardial Infarct in Valencia, Alicante, and Castellon)

a contributing factor, becoming the primary cause of death in men older than 45 years of age and in women older than 65 years of age. Acute myocardial infarction (AMI) is the most frequent cause of ischemic heart death, occurring in 68% of cases.[2]

In order to collect precise information on the management of AMI in our region, in 1995 a register (PRIMVAC register) was created of patients in Valencia who had AMI and were admitted to cardiac intensive care units (CICU).[3] This type of register facilitates acquiring information about the features of AMI in patients admitted to the CICU and the treatment modalities used in different regions or countries. This, in turn, facilitates analyzing the usefulness of various diagnostic and therapeutic regimens recommended in the guidelines issued by various scientific societies.[4] Similarly, these registers allow an overview closer to real-life experience, which is frequently quite different form the data obtained in clinical trials.

The aim of this study was to identify demographic characteristics, risk factors and coronary antecedents; treatment delays; treatment strategies; and complications that developed in patients with AMI who were younger than 45 years of age and who were included in the PRIMVAC register, and to analyze differences as compared with older patients (aged 45 years or older). This is likely the first study of this type performed on a young population in the Mediterranean area, a population considered to be low-risk for ischemic heart disease.

PATIENTS AND METHODS

Patients

We included in our study all patients younger than 45 years of age who were admitted to CICUs in the area of Valencia and discharged with the diagnosis of AMI according to accepted criteria (clinical, electrocardiographic, and enzyme data) between 1995 and 1999.

Participating centers

Seventeen hospital centers out of a total of 25 centers that treat AMI patients (19 in the public network and 6 in the private sector) in the Valencia area participated in the study. Criteria for inclusion in the register are detailed in a previous study.[3] Overall, the population treated by the participating hospitals has been consistently approximately 72% of the Valencia population, which during the study period consisted of 4 066 474 inhabitants.[5]

Variables analyzed

The definition of the variables analyzed in the PRIMVAC register was discussed in a previous article.[6] Data on the following variables were collected:

1. Demographic characteristics: age and sex.
2. History of heart disease: previous angina or infarct, angioplasty, and aortocoronary bypass surgery.
3. Coronary risk factors: arterial hypertension (AHT), hypercholesterolemia, history of smoking, and diabetes.
4. Delayed treatment: the following times were noted: *a)* time elapsed from the onset of symptoms to arrival at the hospital; *b)* time elapsed from the entry to the emergency room to transfer to the CICU, and *c)* time elapsed from onset of symptoms to the initiation of thrombolysis.
5. AMI data.
6. Diagnostic and therapeutic procedures performed during the CICU stay, even if performed outside of the participating hospital.
7. Medication administered.
8. Complications that developed in the CICU.

Statistical analysis

Descriptive statistics

Categorical variables were expressed as percentages with regard to the total effective variables (n), while the quantitative variables were expressed as n, median (M), and standard deviation (SD). When a particular quantitative variable did not follow normal distribution, the mean (50th percentile) was used as the defining parameter and the range or interquartile trajectory (75th to 25th percentile) was used for the dispersion parameter, avoiding excessive weighting some extreme values could have in the analysis. Tests of normalcy were performed with the Kolmogorov-Smirnov test with Lilieford correction.

Univariate analysis

When the predictive variable and the variable effect were absolute, the Pearson X2 test was performed. If

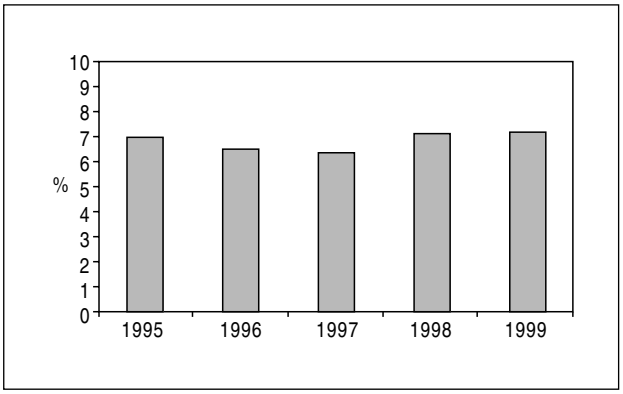

Fig. 1. Changes in the percentage of AMI in young patients over the course of the study.

the application assumptions of the test were violated, the Yates correction or the exact Fisher test was used (see tables 2×2).

When the dependent variable was quantitative, the Student t test was used. In the case of non-Gaussian quantitative variables, the Mann-Whitney test was used. All tests were bilateral and with an alpha risk of 0.05.

RESULTS

The PRIMVAC register recorded a total of 10 213 patients with AMI admitted to the CICU of 17 hospitals in the Valencia community from 1995 to 1999. Six point eight percent (691 patients) were younger than 45 years of age (group A) and the remaining 93.2% (9436 patients) were 45 years of age or older (group B). After analysis of the percentage of patients younger than 45 years of age over the 5-year study period, we did not observe significant annual differences; percentages ranged from 6.3% to 7.2% of the total number of cases (Figure 1).

Clinical characteristics

The mean age of group A was 40.06 years (SD, 4.92 years), with 10.1% (70 patients) being women. Mean patient age in group B was 67.30 years (SD, 10.13 years), and 24.8% of patients were women. Both variables were statistically significant (Table 1).

Smoking was the most frequent risk factor for patients in group A, documented in 80.9% of patients, followed by a history of hypercholesterolemia (39.9% of patients), AHT (24.5% of patients), and diabetes (8.4% of patients). Comparative analysis of groups A and B revealed that the prevalence of the various risk factors showed statistically significant differences (Table 1).

In group A, 73 patients had a history of AMI (6.9%). There was a low prevalence (0.7%) of intermittent claudication in patients in this age group. In group B, a history of angina, AMI, and intermittent claudication occurred more frequently compared with the group of younger patients; differences were statistically significant (Table 1).

TABLE 1. **General characteristics of the patient sample History of cardiovascular disease**

	Group A (n=691)	Group B (n=9436)	*P*
Cases	6.8% (691)	93.2% (9436)	
Age, years	40.06 (4.92)	67.30 (10.13)	.0001
Men	89.9% (621)	75.2% (7098)	.00001
Women	10.1% (70)	24.8% (2338)	.00001
Smoker	80.9% (559)	34.1% (3216)	.00001
Ex-smoker	6.4% (44)	17.7% (1668)	.00001
Hypercholesterolemia	39.9% (276)	28.6% (2703)	.00001
AHT	24.5% (169)	46.4% (4376)	.00001
Diabetes	8.4% (58)	28.9% (2729)	.00001
Intermittent claudication	0.7% (5)	5.7% (541)	.00001
Previous angina	10.6% (73)	22% (2078)	.00001
Previous AMI	6.9% (48)	18.3% (1726)	.00001
Previous PTA	1.2% (8)	1.5% (146)	NS
Previous bypass	0.3% (2)	1.4% (131)	.01

The absolute number of cases is given in parenthesis.
PTA indicates percutaneous transluminal angioplasty; AHT, arterial hypertension; NS, not significant.

AMI characteristics

In group A, 81.8% of patients presented with AMI with Q-wave, 17.1% of patients presented without Q-wave, and in 1.2% of patients it was not possible to determine whether or not Q-wave was present (due to the presence of a pacemaker, complete left branch block of the bundle of His [BCRIHH], etc). In group B, the type of AMI that occurred most frequently was also AMI with Q-wave (in 75.2% of patients), while the presence of Q-wave was undetermined in 5.3% of patients, a significant difference with respect to the group of younger patients. The location of the infarct that was more frequent in the younger group of patients was inferior or posteroinferior (in 53.4% of patients), followed by the anterior face in 38.8%. In group B, the occurrence of infarcts was inferior or posteroinferior (in 44% of patients) and anterior (in 42.7% of patients) with a similar frequency of occurrence. Involvement of the right ventricle was rare, affecting approximately 7% of patients in both groups.

Time elapsed

The mean time elapsed from the onset of symptoms to thrombolysis in group A was 150 minutes, while for the patients in group B it was significantly longer at 180 minutes. The younger patients arrived at the hospital sooner (Table 2). The mean time elapsed from the onset of symptoms to arrival at the CICU was 215 mi-

TABLE 2. **Time elapsed for both groups (min)**

	Group A (n=691)	Group B (n=9 436)	*P*
Pain to hospital	120 (60-260)	160 (85-350)	.0001
Center to CICU	50 (25-126.5)	60 (26-160)	NS
Pain to CICU	215 (115-450)	260 (140-560)	.0001
Thrombolysis delay	150 (100-250)	180 (120-290)	.0006

The data is expressed as mean with the 25th and 75th percentiles shown in parenthesis. NS indicates not significant.

TABLE 3. **Diagnostic and therapeutic procedures performed during patients´ CICU stay**

	Group A (n=691)	Group B (n=9436)	*P*
Echocardiography	27.4% (189)	22.2% (2095)	.001
Swan-Ganz	3.5% (24)	4% (377)	NS
Temporary pacemaker	2.6% (18)	5.8% (549)	.0003
Cardioversion	3.6% (25)	3.7% (346)	NS
CPR	4.2% (29)	8.1% (763)	.0002
Balloon counterpulsation	0.4% (3)	0.6% (52)	NS
Coronary angiography	10.9% (75)	6.4% (605)	.0005
PTA	8.8% (61)	4.1% (387)	.00001
Cardiac surgery	0.4% (3)	0.5% (44)	NS
Isotopes	0.7% (5)	0.3% (33)	NS
Ventilator	4.3% (30)	8.5% (803)	.0001
Dialysis	0.1% (1)	0.4% (37)	NS

The absolute number of cases is shown in parenthesis. PTA indicates percutaneous transluminal angioplasty; NS, not significant; CPR, cardiopulmonary resuscitation.

TABLE 4. **Drugs administered during the acute phase of myocardial infarct**

	Group A (n=691)	Group B (n=9436)	*P*
Thrombolysis	59.9% (277)	45.9% (5103)	.00001
rTPA	65.1% (270)	56.6% (2460)	.00001
Streptokinase	18.1% (75)	30.5% (1325)	.00001
APSAC	9.4% (39)	7.5% (327)	NS
Urokinase	0.7% (3)	0.3% (11)	NS
Other	6.7% (28)	5.2% (226)	NS
Aspirin	94.5% (653)	87.6% (8268)	.00001
Heparin	70.6% (488)	59.6% (5624)	.00001
i.v. nitroglycerine	66.1% (457)	66.8% (6301)	NS
Beta-blockers	38.4% (265)	19.8% (1864)	.00001
ACEI	29.5% (204)	37.4% (3529)	.00003
Oral nitrates	27.1% (187)	34.5% (3259)	.00006
Lidocaine	16.1% (111)	10.5% (995)	.00001
Diuretics	9.3% (64)	26.4% (2,492)	.00001
Dopamine/dobutamine	6.1% (42)	19.4% (1834)	.00001
Amiodarone	3.2% (22)	9.3% (876)	.00001
Digital	2.9% (20)	8.9% (836)	.00001
Diltiazem	3% (21)	3.3% (312)	NS
Nifedipine	1.6% (11)	1.9% (180)	NS
Verapamil	0.3% (2)	0.5% (46)	NS

The absolute number of cases is shown in parentheses.
ACEI indicates angiotensin converting enzyme inhibitor; NS, not significant.

nutes for the patients in group A, significantly less than the mean time of 260 minutes for the patients in group B.

Procedures

The diagnostic and therapeutic procedures performed during the patients´ stay in the CICU are shown in Table 3. Echocardiography was the procedure most often used in group A (27.4% of patients), and was used less frequently in group B. Coronary angiography was performed in 10.9% of the patients in group A, a number significantly greater than that occurring in group B (6.4%), as was PTA (8.8% of patients in group A vs 4.1% of patients in group B). Cardiac surgery was rarely performed in the younger group of patients, and there was no notable difference with respect to the group of older patients (Table 3).

Pharmacological treatment

Thrombolysis was performed on 59.9% of the patients in group A (414) and in 45.9% of the patients in group B ($P<.00001$). The use of a thrombolitic agent varied according to age, although the medication most often used for both groups of patients was recombinant tissue plasminogen activator (rTPA). The reasons for not performing thrombolysis in group A were: time constraints (33.5% of patients), medical contraindication (12.1% of patients), and other causes (54% of patients). In group B, thrombolysis was not performed due to: time constraints (33.7% of patients), medical contraindication (18.7% of patients), age (3.9% of patients), and other causes (43.7% of patients).

Aspirin, intravenous (i.v.) heparin, and i.v. nitroglycerine were the medications used most often in the treatment of the younger patients in the CICU; this was also the case for the patients in group B, although to a lesser extent (Table 4). Beta-blockers were administered to 38.4% of the younger patients and ACEI (angiotensin converting enzyme inhibitors) in 29.5%. Other medications, such as inotropic agents, digoxin, and diuretics, were used more often in the group of older patients.

Developing complications

Arrhythmia complications

During their stay in the CICU, a small number of the younger patients presented with malignant ventricular arrhythmias: 9.1% presented with ventricular tachycardia (VT) and 8.8% with ventricular fibrillation (VF). The incidence of these arrhythmias was significantly lower in the patients in group B. Conversely, atrial fibrillation and 3rd degree AV block occurred more frequently in the patients in group B (Table 5).

Mechanical complications. Degree of left ventricular insufficiency

Rupture of the free wall occurred rarely in group A and occurred more frequently in group B. The majority of patients in group A were classified as Killip grade I (85.5% of patients), while only 4.2% of patients were classified as Killip grade IV. In group B, 61.1% of patients were classified as Killip grade I and 11.5% of patients were classified as Killip grade IV ($P<.00001$).

Ischemic complications

In group A, 5.9% of patients presented with post-infarct angina, a percentage that was similar to that observed in group B (6.8% of patients). Acute myocardial re-infarction occurred in 2 patients in group A (0.3%), a significantly lower number than that occurring in group B (3.2%).

Mortality

The overall mortality rate for the patients in group A was 3.4% (24 patients), while in group B it reached 14% (1322 patients). In the group of younger patients, the mortality rate was significantly greater among women (14.3%) than men (2.3%). These differences were also observed in group B, where the mortality rate was 11.4% for men and 22% for women ($P<.0001$).

With respect to the mean length of CICU stay, it was significantly greater in group B as compared to the younger group of patients (4.05 days vs 3.62 days; $P<.005$).

TABLE 5. **Evolutionary complications in the CICU**

	Group A (n=691)	Group B (n=9436)	*P*
Mortality	3.5% (24)	14% (1322)	.00001
Arrhythmia complications			
VT	9.1% (63)	6.4% (604)	.005
VF	8.8% (61)	4.9% (459)	.00001
AC×AF	1.9% (13)	10.7% (1008)	.00001
AVB 3	3.2% (22)	5.8% (545)	.004
AIVDD	1.7% (12)	3.2% (303)	.03
Mechanical complications			
IVC	0.1% (1)	0.7% (63)	NS
FWR	0.1% (1)	1.5% (146)	.002
PMR	0.1% (1)	0.2% (19)	NS
PMD	0.6% (4)	0.6% (58)	NS
Killip III-IV	6.7% (46)	22.1% (2.082)	.00001
Ischemic complications			
Post infarct angina	5.9% (41)	6.8% (644)	NS
Re-AMI	0.3% (2)	3.2% (305)	.00001
Other complications			
Peripheral embolism	0.1% (1)	0.1% (11)	NS
ACVA	0.4% (3)	0.8% (80)	NS

The absolute number of cases is shown in parentheses.
AC×AF indicates atrial fibrillation; ACVA, acute cerebrovascular accident; AVB 3, grade 3 AV block; IVC, intraventricular communication; DMP, papillary muscle dysfunction; FV, ventricular fibrillation; NS, not significant; Re-AMI, acute myocardial re-infarction; PMR, papillary muscle rupture; FWR, free wall rupture; TCIVA, acute intraventricular conduction disturbance; VT, ventricular tachycardia.

DISCUSSION

In spite of the fact that atherosclerosis is a progressive disease that manifests early, the appearance of an AMI in young patients does not occur frequently. Various studies have cited that between 2% and 10% of all patients with AMI are hospitalized,[7,8] which is similar to the findings our register reflects; in addition, we did not observe any significant changes in the incidence over the 5-year study period.

General characteristics. Risk factors

Our study shows that AMI in young patients occurs typically in men. Our finding of a 90% occurrence rate in men is similar to that in other studies.[7,8] These results suggest that women are protected from developing AMI until menopause; since there is such a low occurrence rate in young patients,[9] there is little information available with respect to the etiology, clinical findings, and prognosis with regard to AMI in this population.

Smoking is the risk factor that occurs most frequently in young patients, affecting 76% to 91% of all young people, while in older people the prevalence drops to approximately 40%,[10,11] similar to the findings from our study. Even the actual number of cigarettes smoked per day is significantly higher in young patients as compared to older patients.[12] In an American study of 2643 patients with AIM, of which 203 were younger than 45 years of age, only 8% of the patients under the age of 45 years had never smoked.[13] In our study, the percentage of patients who had never smoked was 13%.

The prevalence of a history of hypercholesterolemia in young patients with AMI varies from 12% to 89%.[10,12] In our study the rate was 40%, and, as described in the medical literature, this is the risk factor that occurs most frequently in younger groups of patients as compared to older patients.[12,14,15]

AMI characteristics

With respect to the most frequent location of AMIs in young patients, there are discrepancies between published studies. Some studies indicate, as does ours, that the inferior wall is the most common site,[8,16] while other studies identify the anterior wall as the most common AMI location in young patients.[15,17] Q-wave

AMIs were the most frequent type of infarct among the patients admitted to our CICU, regardless of the patient's age, and occurred at a rate similar to that reported in other published studies (approximately 80%).[18,19]

Elapsed time

In our study, the amount of time elapsed from the onset of symptoms to the administration of thrombolitic therapy in the young patient is less than the amount of time elapsed in the group of older patients, as has been noted in other studies.[20] The longer delay in older patients is a result of a longer time period elapsing from the onset of symptoms to the patient's arrival at the hospital emergency department, while the amount of time taken to transfer the patient from the hospital center to the CICU was similar for both groups. The amount of time elapsed from the beginning of AMI symptoms and arrival at the hospital for younger patients is similar to that noted in a British register of patients younger than 50 years of age (119 minutes).[18] On the other hand, the time elapsed before thrombolysis is initiated is less than the time recorded in that study, probably because of administration delays in the pre-hospital phase. Our data confirm that the patient delay in recognizing symptoms accounts for the longest delays, as has been noted in several studies.[19,21,22] This finding reinforces the importance of health education programs for patients and families of patients who are known to have heart disease or who are among those at high risk for heart disease.

Diagnostic and therapeutic procedures

The use of echocardiography in the acute phase of AMI in the group of young patients in our study, despite the fact that it was the diagnostic procedure most frequently used (27%), was much lower than reported in other international studies.[8,17,23]

The infrequent use of certain diagnostic and therapeutic procedures such as coronary angiography and isotopic techniques noted in other studies[15,17] is probably related to the fact that the majority of the hospitals that participated in our study did not have a hemodynamic or nuclear cardiology laboratory available; nonetheless, the data we present is typical of intra-CICU stays. It is likely that the rate at which these diagnostic techniques are used and the resulting treatments initiated would be higher if we had analyzed the hospital phase. In the Spanish PRIAMHO study,[6] the use of coronary angiography and invasive revascularization techniques varied the most among procedures used for AMIs, with the mean use of coronary angiography being lower (9%) than that reported in other studies.[24,25]

Pharmacological treatment

In spite of the widely documented proven benefits of thrombolitic therapy in patients with AMI and ST segment elevation, it is disturbing that more than one-third of patients in whom the use of thrombolitic therapy is indicated do not receive it;[26] this percentage is lower in reports on young patients. Similarly, in a study performed in London on 1225 patients, the percentage of fibrinolysis in patients younger than 50 years of age (190 patients) was 82.6%; this number decreased to 66% in between 70 and 79 years of age.[18] In our series, the rate of use of thrombolitic therapy in young patients was even lower, although it was at an acceptable rate, and decreased in the group of patients older than 45 years of age. The reason for the less frequent use of thrombolitic therapy in older patients, according to the PRIMVAC register, is a result of an increase in medical contraindications for this type of therapy in these patients (approximately 19%), coupled with the greater age of these patients (which accounted for thrombolitic therapy not being initiated in approximately 4% of patients). The influence of time was similar in both groups, affecting close to a third of all patients, although the younger patients arrived at the hospital earlier than the older patients. Perhaps the delay in the diagnosing AMI in the group of young patients in the emergency room explains this discrepancy.

In spite of broad therapeutic application and the recommendations of consensus documents about the use of beta-blockers in AMI,[27] only a little more than one-third of our young patients received this treatment in the acute phase of myocardial infarction, while the percentage of patients receiving the therapy dropped to 20% in patients older than 45 years of age, probably due to the increase in contraindications for its use.[18,28] Recently, an American study of 976 patients was published that showed an 82.3% use of beta-blocker therapy in the acute phase of AMI for patients of all ages, and of 87% for patients younger than 46 years of age.[8] In spite of our under-utilization of this therapy compared with that shown in international studies, we have observed an increase in the use of beta-blocker therapy in the Valencia community over the last few years. In the RICVAL register, which collected data from 1124 patients with AMI between 1993 and 1994 in the city of Valencia, the percentage of use of beta-blockers in patients younger than 60 years of age was 20%, was 12% for patients between the ages of 60 and 70 years, and was only 4.4% for patients older than 70 years of age.[29]

Acute complications and prognosis

In our register, the prevalence of malign ventricular arrhythmias (tachycardia and ventricular fibrillation) among young patients is slightly greater than that

found in other studies,[30] and drops significantly among the group of older patients. Perhaps the greater prevalence of these early arrhythmias in the group stems from the fact that younger patients arrive at the hospital sooner and as a result, these arrhythmias are diagnosed more frequently. The presence of serious heart failure (Killip grades III and IV) was slightly greater than that noted in other studies, where the rate reaches 3%.[15] This percentage increases significantly when we analyze data from the group of older patients, probably due to a greater prevalence of AMI of the anterior face and a history of myocardial necrosis in this group.

Age was one of the principal independent risk factors for death, with youth being associated with a more favorable outcome.[7,8,28] In our study, we observed that the intra-CICU course was generally quite good, with a mortality rate of 3.4% (24 patients), results that are similar to those of other studies, where a mortality rate of 2.5% was noted in patients younger than 45 years of age, in comparison with 9% in patients between 45 and 70 years of age, and 21.4% in very old patients.[13]

As other authors have pointed out,[31] our study also confirms a significantly greater mortality rate in young women compared with men (14.3% vs 2.3% of patients, respectively).

Study limitations

Given that most deaths due to AMI occur during the first hours after symptoms develop – generally before medical care is received[32] – the data from our register, limited to AMI cases admitted to the CICU, do not truly reflect the incidence and lethal nature of the illness in young patients. Nevertheless, the data is useful as it provides further information on the demographic, clinical, and prognostic data on young patients with AMI who are admitted to a CICU in our community, as well as the diagnostic and therapeutic procedures used in our country, with the logical assumption that the patients could have undergone other procedures once they were discharged from the CICU.

This makes it possible for our data to be used to analyze the overall patterns of health care provided for young patients with AMI in this community, allowing us to compare this with the registries from other regions or countries and with the recommendations of the expert panels.

APPENDIX

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