ORIGINAL ARTICLE

Acute Myocardial Infarction with Persistent ST-Segment Elevation. SCAR (Acute Coronary Syndromes in Argentina) Multicenter Registry from the Argentine Society of Cardiology

Infarto agudo de miocardio con supradesnivel persistente del segmento ST. Registro multicéntrico SCAR (Síndromes Coronarios Agudos en Argentina) de la Sociedad Argentina de Cardiología

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ABSTRACT

Introduction: Acute coronary syndrome registries made by the Argentine Society of Cardiology provide current and comparative information on their evolution, whose analysis allows to know the mortality rate and the different regional treatment patterns, and to evaluate the relationship between outcomes and demographic variables, clinical characteristics and therapy applied in "real life".
Objectives: To analyze the clinical, therapeutic and outcome characteristics of ST segment elevation acute myocardial infarction (STEMI) included in a multicenter registry conducted by the Argentine Society of Cardiology in 2011.
Methods: Patients diagnosed with STEMI included in the multicenter SCAR (Acute Coronary Syndromes in ARgentina) registry were analyzed. Data from centers that participated in the 2005 and 2011 registries were compared.
Results: The study included 476 patients. Twenty-five percent of patients were women, mean age was 61 ± 12.3 years, and 70% received reperfusion therapy: 20% (n = 92) with thrombolytics and 50% (n = 238) with primary angioplasty. In-hospital mortality rate due to STEMI was 8%. Independent predictors of death were age over 70 years (OR 2, 95 % CI 1.2-3.3, p = 0.003), not having received reperfusion therapy (OR 1.72, 95 % CI 1.1 - 2.0, p = 0.01) and cardiogenic shock (OR 37, 95 % CI 12-117, p < 0.0001). Comparison of the same centers showed that in 2011 the number of cases that did not receive reperfusion therapy was reduced by 30%, with increased use of primary angioplasty [OR 3.7 (95 % CI 1.6-4, p < 0.001)]. A reduction of in-hospital mortality [OR 0.40 (95 % CI 0.23-0.83, p = 0.01)] was also identified.
Conclusions: Seventy percent of patients with STEMI included in the SCAR registry received reperfusion therapy, while mortality rate was 8%. Compared with 2005, an increase of primary angioplasty and decreased in-hospital mortality was observed, among other findings

Key words: Myocardial Infarction - Epidemiology - Therapeutics - Reperfusion.

RESUMEN

Introducción: Los registros de síndromes coronarios agudos realizados por la Sociedad Argentina de Cardiología aportan información actualizada y comparativa sobre su evolución, cuyo análisis permite conocer la tasa de mortalidad, diferentes patrones de tratamiento regionales y evaluar la relación entre los resultados y variables demográficas, características clínicas y terapéutica aplicada en la "vida real".
Objetivos: Analizar las características clínicas, terapéuticas y evolutivas del infarto agudo de miocardio con supradesnivel del segmento ST (IAMST) incluidos en un registro multicéntrico realizado por la Sociedad Argentina de Cardiología durante 2011.
Material y métodos: Se analizaron pacientes con diagnóstico de IAMST incluidos en el registro multicéntrico SCAR (Síndromes Coronarios Agudos en ARgentina). Se compararon datos de centros que participaron en los registros de 2005 y de 2011.
Resultados: Se incluyeron 476 pacientes. Una cuarta parte fueron mujeres, la edad media fue de 61 ± 12,3 años, el 70% recibió tratamiento de reperfusión: 20% (n = 92) con trombolíticos y 50% (n = 238) con angioplastia primaria. La mortalidad hospitalaria de los IAMST fue del 8%. Fueron predictores independientes de muerte la edad mayor de 70 años (OR 2, IC 95% 1,2-3,3; p = 0,003), no haber recibido tratamiento de reperfusión (OR 1,72, IC 95% 1,1-2,0; p = 0,01) y el shock cardiogénico (OR 37, IC 95% 12-117; p < 0,0001). Comparando los mismos centros, en 2011 se redujo en un 30% el número de casos que no recibieron tratamiento de reperfusión, con un incremento del uso de la angioplastia primaria [OR 3,7 (IC 95% 1,6-4; p < 0,001)]. Se detectó también una reducción de la mortalidad hospitalaria [OR 0,40 (IC 95% 0,23-0,83; p = 0,01)].

Palabras clave: Infarto del miocardio - Epidemiología - Tratamiento – Reperfusión.

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Abbreviations

ACEI	Angiotensin converting enzyme inhibitors		**KK**	Killip and Kimball
AMI	Acute Myocardial Infarction		**LBBB**	Left bundle branch block
ASA	Acetylsalicylic acid (aspirin)		**LMWH**	Low molecular weight heparin
TCA	Transluminal coronary angioplasty		**SAC**	Argentine Society of Cardiology
CABG	Coronary artery bypass grafting		**STEMI**	ST-segment elevation acute myocardial infarction
CK	Creatine kinase		**STEACS**	ST segment elevation acute coronary syndrome
CPK	Creatine phosphokinase		**CVA**	Stroke (cerebrovascular accident)
ECG	Electrocardiogram		**TL**	Thrombolytics
GP IIb/IIIa	Glycoprotein IIb/IIIa		**CCU**	Coronary care unit
IQR	Interquartile range			

INTRODUCTION

Coronary heart disease still remains a public health problem in Argentina. Registries are useful to know the mortality rate, the different patterns of regional treatment and to evaluate the relationship between outcomes and demographic variables, clinical characteristics and therapeutics applied in "real life".

The GRACE registry showed worse prognosis after acute myocardial infarction (AMI) in patients from Latin America compared with those of Europe and the United States. (1, 2) International data registries may not be representative of what occurs in Argentina, due to health policy differences and the healthcare system organization.

For this reason, the registries made by the Argentina Society of Cardiology (SAC) since 1987, provide current and comparative information of its evolution, at least among the centers voluntarily participating in these studies.

The SCAR registry (Argentine Registry of Acute Coronary Syndromes), conducted by SAC in 2011, included patients admitted with a final diagnosis of acute coronary syndrome. The main objective of this analysis is to update the current status of patients diagnosed with STEMI and to compare the clinical outcome and therapeutic characteristics of patients in centers that participated in the registry developed by SAC in 2005 and in 2011 (SCAR).

METHODS
Inclusion criteria

The SCAR registry was conducted by the Research Area and Emergency Cardiovascular Council of the Argentine Society of Cardiology (SAC). It was a cross-sectional, multicenter study whose main objective was to compare the clinical outcome and therapeutic characteristics with previous registries in the same participating centers.

Data were collected in a file by investigators from centers associated to the Argentine Society of Cardiology nationwide and sent either by post or through the web.

Bioethical Aspects

The protocol was approved by the SAC Ethics Committee. Since personal data and follow-up were not required, an informed consent was not necessary for inclusion in the registry, in agreement with the Habeas Data national law N° 25326 (Data Protection Act of Argentina). Due to the observational character of the registry, behaviors and treatments adopted were performed according to the criteria of each local investigator.

Population
Inclusion criteria for the analysis of AMI:

- Two of the following three criteria:
  a)   Symptoms compatible with myocardial ischemia of at least 20 min duration,
  b)   ST segment changes or T wave inversion in two leads compatible with myocardial ischemia or new left bundle branch block (LBBB) or development of new pathological Q waves.
  c)   CK Elevation
- STEMI: ST segment elevation ≥ 1mm in at least two contiguous leads or new LBBB or new pathological Q waves on the ECG.

Definitions

Definitions of events considered as endpoints and of the analyzed variables are explained in Appendix 1.

Center Characterization

Centers of the Autonomous City of Buenos Aires included in a Census of Intensive Critical Care Units (Coronary Care Units, Multipurpose Intensive Care Units) of the Autonomous City of Buenos Aires and centers in Provinces included in the SAC Regional Districts were invited to participate in the study. The participation was accepted by 87 centers, of which 41% belonged to CABA, 17% to the Greater Buenos Aires and 42% to the provinces. (Appendix 2)

A training system for medical residents was available in 55.2% of hospitals, 77.3% of centers had a Hemodynamics Laboratory (95% during 24 hours) and 74.3% had Cardiovascular Surgery.

Enrollment

Patients were consecutively included over a period of three months in each institution. The registry was active from March to October 2011. Onset of inclusion at each site depended on local regulatory or logistic reasons.

Data

Data loading into the database was made by each of the participating centers via a web application (https://es.surveymonkey.com/), coordinated by the SAC Research Area. The database was closed once the clearance phase of inconsistent / incomplete data observed in real time was completed. Patient history and coronary risk factors, previous treatment, clinical and electrocardiographic presentation, complementary tests (blood tests, ventricular function assessment, coronary angiography), in-hospital events,

adopted treatment and strategies, both in the acute phase and at discharge, were recorded.

Statistical Analysis

Continuous variables are presented as mean ± standard deviation (SD) or median and its 25-75% interquartile range, depending on normal or non-parametric distribution. The t-test and the Wilcoxon rank-sum test were used for comparisons, as applicable. Normality was analyzed by histogram, the relationship between the mean and the median, the skewness and kurtosis values, and by the Shapiro-Wilk test. Qualitative variables were expressed as percentages and were compared using the chi-square test or Fisher´s exact test.

The regression analysis was initiated with a multivariate regression model using the enter and stepwise method. The linearity assumption was corroborated for continuous variables. A p value < 0.05 was considered statistically significant.

All analyses were performed with STATA 9.0 (STATA Corporation, College Station, TX®) software package.

RESULTS

Of the 1330 patients in the SCAR registry, 758 presented with AMI: 476 (60.5%) with STEMI and 282 (39.4%) with AMI without ST-segment elevation. Baseline characteristics of the STEMI population are shown in Table 1. Mean age of patients with STEMI was 61 ± 12.3 years, 25% were women, 42% were active smokers, 1 in 5 was diabetic, 50% were dyslipidemic and 63% hypertensive. Seven percent of patients had history of chronic stable angina, 13% of myocardial infarction, 10% of coronary angioplasty (TCA) and 2% of coronary artery bypass surgery.

History of non-cardiovascular diseases and pre-hospital treatment are also described in Table 1.

Clinical presentation and initial treatment

Two thirds of the patients were admitted from home (68.4%), while the remaining third (31.6%) was referred from another medical institution. The median time from onset of symptoms to admission was 120 min. (25-75 IQR: 60-330) and the delay was greater, 240 min (25-75 IQR: 120-510) when the patient was referred from another healthcare center.

Before admission, 25% of patients presented with angina at 24 hours. On admission, 374 patients (79%) were in KK class A, 62 (13%) in KK class B, 11 (2%) in KK class C and 29 (6%) in KK class D.

Initial treatment included: anticoagulation in 50% of patients (61.4% with low molecular weight heparin (LMWH), for a median of 3 days (25-75 IQR: 2-5), 87% with clopidogrel and 13% with prasugrel. Antiplatelet therapy was initiated in the Coronary Care Unit (CCU) in 53% of cases, in the emergency department in 29% of cases, immediately before TCA in 11% of cases and after TCA in 7% of patients. The clopidogrel loading dose was 600 mg in 35% of patients and 300 mg in 62% of patients.

During hospitalization, 99% were treated with aspirin (ASA), 89% with beta blockers, 95% with

Table 1. Population characteristics, risk factors, history and previous treatment (n=476)

	n (%) or mean ± SD
Age, years	61 ± 12.3
Male gender	357 (75)
BMI	27.9 ± 4.6
Diabetes	95 (20)
Diabetic patients treated with insulin	52 (11)
Smoker	200 (42)
Ex-smoker	104 (22)
Dyslipidemia	242 (51)
Family history	95 (20)
Hypertension	299 (63)
Stress	257 (54)
Chronic angina	33 (7)
Previous infarction	61 (13)
Previous angioplasty	47 (10)
Previous revascularization surgery	9 (2)
Hospitalization for heart failure	14 (3)
Chronic obstructive pulmonary disease	28 (6)
Hospitalization for unstable angina	24 (5)
Stroke	14 (3)
HIV	6 (1.3)
Neoplasia	13 (2.9)
Known coronary obstructions > 50%	85 (18)
Chronic renal failure	11 (2.3)
Peptic ulcer	15 (3.2)
History of hemorrhage	10 (2.1)
Antiplatelet medication	130 (29)
Use of ACEI o ARA II	187 (39.3)
Use of statins	85 (18)
Use of betablockers	120 (25.2)

SD: Standard deviation. BMI: Body Mass Index. HIV: Human immunodeficiency virus. ACE Angiotensin-converting enzyme inhibitors. ARA II: Angiotensin II receptor antagonists

statins and 81% with angiotensin-converting-enzyme inhibitors (ACEI). Thirteen percent of patients were treated with GPIIb/IIIa inhibitors; the most used was tirofiban (80%), followed by abciximab (10%), and eptifibatide (9%). In 80% of cases, these drugs were infused during the TCA procedure.

Patients with STEMI received reperfusion therapy in 70% of cases, and 92 of these patients were reperfused with thrombolytics (TL) (91% with streptokinase). The time from onset of pain to TL treatment was 180 min. (25-75 IQR: 110-250) and the door-to-needle time was 55 min. (25-75 IQR: 29-90).

A total of 285 patients underwent TCA: 238

patients (83.5%) underwent primary TCA, 29 (10%) rescue TCA, 16 (6%) pharmacoinvasive strategy and 2 (0.7%) facilitated TCA. In 14% of cases drug-eluting stents were implanted. The door-to-balloon time was 107 min. (25-75 IQR: 60-231). In 27.5% (n = 135) of cases, patients were admitted during the weekend. The door-to-balloon time was shorter in patients admitted during weekdays compared to weekends: 95 (25-75 IQR: 50-210) vs. 115 (25-75 IQR: 70-240) minutes. respectively (p = 0.05). The median time between onset of symptoms and first balloon inflation was 240 min. (25-75 IQR: 160-260) and 300 min. (25-75 IQR: 175-600) in patients who were referred from another institution (p = 0.04).

The reasons for not performing reperfusion therapy are detailed in Table 2.

In-hospital outcomes and events

Median hospital stay was 5 days (25-75 IQR: 4-7) and CCU stay was 4 days (25-75 IQR: 3-5). Resources used during hospitalization were: intra-aortic balloon pump counterpulsation in 17 patients (3.7%), temporary pacemaker in 25 (4%), mechanical ventilation in 43 (8%) and inotropics in 66 (15%).

Table 3 details in-hospital events, among which the outstanding event was in-hospital death in 38 (8%) patients, most due to cardiac causes (89%).

Table 4 describes mortality by subgroups.

After multivariate logistic regression analysis, the variables independently associated with in-hospital death were: age > 70 years (OR 2, 95% CI 1, 2-3.3, p = 0.003), not receiving reperfusion therapy (OR 1.72 CI, 95 1.1-2.0%, p = 0.01) and in-hospital development of cardiogenic shock (OR 37, 95% CI 12-117, p <0.0001).

Comparison between 2005 and 2011 (SCAR) SAC registries

The analysis included 407 patients with STEMI from 28 centers that participated in both SAC registries (2005 and 2011). The definitions of AMI and coronary risk factors were the same in both registries. Table 5

Table 2. Causes for not performing reperfusion treatment (n=99).

Causes	n (%)
Late presentation	48 (48.5)
Transient ST-segment elevation	17 (17.2)
Anatomy	8 (8.1)
Small AMI	2 (2.1)
Hypotension	1 (1.1)
Contraindicated for another reason	2 (2.1)
Not diagnosed	1 (1.1)
Patient's refusal	1 (1.1)
Unknown reason	19 (19.2)

AMI: Acute myocardial infarction

Table 3. In-hospital events

Events	n (%)
Acute mitral regurgitation	7 (1.5)
Interventricular communication	2 (0.5)
Systemic embolisms	3 (0.6)
PAMIA	27 (6)
Reinfarction	28 (6)
Acute atrial fibrillation	7 (1.5)
Stroke	7 (1.5)
- Hemorrhagic	4 (0.8)
- Ischemic	2 (0.4)
- TIA	1 (0.2)
Major hemorrhage	13 (3)

PAMIA post- acute myocardial infarction angina, TIA: Transient ischemic attack

Table 4. ST segment elevation acute myocardial infarction mortality according to subgroups.

Subgroups	n (%)	p
Women	17 (14.5)	0.01
Men	24 (7.5)	
Age < 50 years	1 (1.2)	0.0001
Age 51 to 60 years	8 (5.8)	
Age 61 to 70 years	12 (9.6)	
Age > 70 years	20 (19.4)	
Time of evolution < 6 h	10 (3.8)	0.03
Time of evolution from 7 to 12 h	6 (6.4)	
Time of evolution > 12 h	3 (8.5)	
Anterior location	18 (10.5)	ns
Non-anterior location	20 (8.8)	
Reperfused	26 (13.6)	0.04
Non-reperfused	14 (7.4)	
Thrombolytics	8 (9.4)	ns
Primary angioplasty	18 (6.9)	
Killip-Kimball A	1 (0.3)	0.0001
Killip-Kimball B	4 (5.8)	
Killip-Kimball C	4 (23.5)	
Killip-Kimball D	30 (66.7)	

shows the comparison of the demographic characteristics and coronary risk factors, where no significant differences were observed. Patients with AMI from the 2011 registry had a more significant history of coronary disease (AMI, TCA. CABG) and greater use of concomitant therapy (aspirin, beta blockers, statins and ACEI). In 2011, the number of non-reperfused individuals decreased by 30%, at the expense of increased primary angioplasty [OR 3.7 (95% CI 1.6-4) p <0.001] and there was a decrease in the use of throm-

bolytic agents [OR 0.76 (95% CI 0.4-1.2) p <0.0001] (see Table 5).

Cardiogenic shock was the main cause of death in both registries: 75% of deaths were associated with cardiogenic shock in the 2005 registry and 50% in the 2011 registry. Mortality due to STEMI with cardiogenic shock was high in both registries: 45% in 2005 and 56% in 2011. The incidence of cardiogenic shock decreased from 2005 to 2011: OR 0.50 (95% CI 0.27 to 0.90, p = 0.04).

Finally, 60% mortality reduction was observed in STEMI from 2005 to 2011 [OR: 0.40, 95% CI 0.23 to 0.83, p = 0.01]. There were no differences in the prevalence of post-AMI angina, reinfarction or stroke.

DISCUSSION

The purpose of this analysis was to describe the evolution and the variables associated with in-hospital outcome in STEMI patients admitted to SAC-related centers

Table 5. Comparison between 2005 and 2011 SAC registries.

Registry	2005 (n=203) n (%)	2011 (n=204) n (%)	OR (CI 95%)	p
Baseline Characteristics				
Women	50 (25)	44 (22)	-	ns
Age, years, mean ± DS	63 ± 13	63 ± 12	-	ns
Hipertensives	128 (63)	138 (68)	-	ns
Smokers	79 (39)	75 (37)	-	ns
Dyslipidemics	108 (53)	108 (53)	-	ns
Diabetics	40 (20)	45 (22)	-	ns
History and previous treatments				
AMI	22 (11)	45 (22)	2.1 (1.3-3.3)	0.0001
TCA	12 (5.8)	30 (15)	3 (1.6-5.6)	0.003
CABG	4 (1.9)	15 (7.4)	4 (1.5-10)	0.003
Previous treatment				
Aspirin	67 (33)	75 (37)	-	NS
Betablockers	45 (22)	75 (37)	2 (1.4-2.9)	0.0001
Statins	22 (11)	51 (25)	2.7 (1.7-4.3)	0.0001
ACEI	65 (32)	85 (42)	1.5 (1.1-2.1)	0.0001
Interval-symptoms-admission, min, median; (25-75 IQR)	222 (135-360)	124 (76-230)	-	0.0001
Data during hospitalization	24 (12)	16 (8)	0.50 (0.27-0.90)	0.04
Killip D				
Development of new Q-waves	128 (63)	69 (34)	0.47 (0.34-0.56)	0.0001
Primary angioplasty	91 (45)	155 (76)	3.7 (1.6-3)	0.0001
Thrombolytics	75 (37)	45 (22)	0.76 (0.4-1.2)	0.0001
Without reperfusion	36 (18)	4 (2)	0.70 (0.6-0.9)	0.0001
Treatment at discharge	138 (68)	187 (91.5)	1.9 (1.1-3.4)	<0.05
Betablockers				
Clopidogrel	152 (75)	173 (85)	4.5 (2.7-7.4)	<0.05
Statins	136 (67)	162 (79.2)	6 (3.2-12)	<0.05
ACEI	82 (40.5)	162 (79.2)	4 (1-21)	<0.05
Aspirin	178 (87.8)	202 (99.5)	5.2 (1.4-18)	<0.05
Hospital events				
Post AMI angina	17 (8.4)	13 (6.7)	-	ns
Reinfarction	5 (2.5)	5 (2.6)	-	ns
Stroke	3 (1.5)	3 (1.3)	-	ns
Death	28 (13.8)	12 (6.2)	0.40 (0.23-0.83)	0.01

AMI: Acute myocardial infarction. CABG: Coronary artery bypass grafting. ACEI: Angiotensin converting enzyme inhibitors. IQR: Interquartile range. CVA: Stroke

Mortality

The present study shows 8% in-hospital mortality, which although is somewhat higher than that of other international registries, as the French registry, (3) is comparable to others such as the Registry get with the guidelines (AR-G). (4) It should be mentioned that observational studies have reported geographic differences in treatment that could be related to variations in the mortality rate (5).

In our country, the recently published CONAREC XVII registry found a similar mortality rate of 8.8% (6).

Pharmacological treatment

Treatment with ASA, clopidogrel / prasugrel, statins, ACEI and beta-blockers was high and comparable to international studies. (4, 7)

The value of time to consultation and treatment

The median onset of pain to admission time was 120 min. (25-75 IQR: 60-330), lower than the last 2005 registry made by the Argentine Society of Cardiology (median 240 min.), (8) and similar to the GRACE (150 min; 25-75 IQR: 100-243), (9) Middle East (165 min; 25-75 IQR: 95-272) (10) and PRIAMHO II (175 min) registries, (11) but higher than that reported by García Escudero et al. (12) in a single center (Hospital Argerich) in our country.

The median door-to-balloon time in our registry was 107 min. (25-75 IQR: 60-231), higher than treatment guideline recommendations. (13) In the GRACE registry (9) it was 86 min. (25-75 IQR: 53-135), and 150 min (25-75 IQR: 105-205) in patients transferred to another center, well below that presented in our registry. Distance and travel times may be associated with mortality. (14).

The median door-to-needle time was 55 min. (25-75 IQR: 29-90), higher than guideline recommendations and that reported in the GUSTO-1(15) and GUSTO-3 (16) studies, where the median time was 66 and 54 min., respectively, and also higher than that referred in the GRACE (9) substudy, where it was only 30 min. (25-75 IQR: 18-60). There are clear regional differences between Europe (26 min.), USA (35 min.), Australia / New Zealand and Canada (32 min.) and Argentina / Brazil (49 min.). In most centers in our country reperfusion therapy decision is taken in the intensive care unit, probably causing in-hospital delays. (12)

In different countries, strategies with healthcare education programs and organization of the emergency system have been implemented to simplify and improve the speed to TL or TCA, including the creation of telephone call centers operated by emergency physicians to activate the preparation of the hemodynamics laboratory upon the patient's first contact with the healthcare system (17-19) or to initiate pre-hospital TL. (20) These programs have reduced reperfusion time (21), door-to-balloon time (22) and door-to-needle time.

Considering the prolonged times observed for primary TCA, mainly in patients referred for angioplasty from another center, the implementation of national and / or regional actions to decrease them would impact on hospital reduction of morbidity and mortality, shortening door-in to-door-out time, i.e. the time between the arrival and transfer of patients that should be referred for treatment, optimizing transportation times and coordination among the centers.

Reperfusion strategy

The high use of TCA reperfusion therapy compared to TL might be explained by the availability of hemodynamics facilities in our registry [(77.3% of the participating centers had a hemodynamics laboratory (95% with 24-hour availability)]. Widimsky et al. (23) found that primary TCA was the dominant reperfusion strategy in European countries (64% of cases). This trend of increased use of primary TCA as reperfusion strategy is also observed in the GRACE study (from 15% in 1999 to 44% in 2006), with a proportional decrease in TL practice. (24) In Middle East countries the behavior seems to be the reverse, 7.6% received TCA whereas 66% received TL, due to the small number of hemodynamics laboratories. (10) This strategy has wide acceptance among cardiologists, as reflected in other registries. (22, 25)

2005-2011 comparative analysis

It is important to underline the substantial reduction in mortality arising from comparing the same centers that participated in two registries with a 6-year difference, even with demographic characteristics and greater burden of coronary background in the 2011 STEMI results. With the actual sample limitations, multiple concurrent causes could be attributed to this situation, as for example, increased rate of therapeutic reperfusion, development of cardiogenic shock and lower onset-to-admission time. Nevertheless, these results should encourage the optimal use of human and structural resources to reduce this mortality, especially in terms of prevention, early diagnosis and management of cardiogenic shock.

Study limitations

Even though the invitation to participate was not selective (through municipal census and SAC Provincial Districts), once again final acceptance and participation occurs in standard-high complexity centers. The results of this voluntary registry are, therefore, far from reflecting the national situation. Furthermore, and due to financial constraints and the huge number of participating centers, an audit of the data sent by the centers was not performed. With respect to the comparison with the 2011 registry, it is suggested that because the comparison was unadjusted, the differences are presented in a more descriptive way than with the intention of inferring causality.

CONCLUSIONS

Seventy percent of patients with STEMI included in the SCAR registry received reperfusion therapy, while mortality rate was 8%. Compared with 2005, an increase of primary angioplasty and decreased in-hospital mortality was observed, among other findings.

Conflicts of interest

None declared.

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Definitions

1. Diabetes: Diagnosis prior to admission or under dietary or medical treatment
2. Hypertension: Diagnosis prior to admission
3. Tobacco consumption: Current smoker or quitted smoking less than 1 year ago
4. Ex-smoker: Quitted smoking at least 1 year before admission
5. Dyslipidemia: Serum cholesterol levels > 200 mg/dL (if the patient remembers the value), otherwise, previous diagnosis of hypercholesterolemia or lipid-lowering therapy.
6. Family history: AMI or documented coronary disease in the father before 55 years of age or in the mother before 45 years.
7. Sedentarism: Lack of suitable exercise in frequency, intensity and time.
8. Stress: Imbalance between the individual's demands and his available resources to meet these requirements, with the possibility of affecting the psychological and physical health of the person.
9. Personal history: Diagnosis prior to admission; when date is requested, if he had more than one diagnosis, enter the most recent.
10. Previous medication: Medication regularly received by the patient during the last week prior to admission.
11. Left ventricular hypertrophy: According to Sokoloff´s criteria
12. ST-segment elevation: ST-segment elevation ≥ 1 mm compatible with myocardial ischemia, in two or more contiguous leads.
13. ST-segment depression: ST-segment depression ≥ 1 mm compatible with myocardial ischemia in two or more contiguous leads
14. Negative T: T wave inversion ≥ 1 mm deep or bipolar T wave with negative deflection ≥ 1 mm deep, compatible with myocardial ischemia, in three or more contiguous leads.
15. Pseudonormal T: Positive previously negative or bimodal T waves compatible with myocardial ischemia, in 3 or more contiguous leads.
16. Killip on admission
    a) Without rales or heart failure
    b) Pulmonary rales < lower 1/3 of the lung fields
    c) Acute pulmonary edema: Pulmonary rales >lower 1/3 of the lung fields.
    d) Cardiogenic Shock
17. Primary angioplasty: Directly performed as first intervention of reperfusion therapy in STEACS patients who have not received any type of coronary reperfusion-oriented medication.
18. Rescue angioplasty: Performed in those patients in whom coronary reperfusion therapy has initially been fibrinolytics, presenting negative reperfusion criteria.
19. Facilitated angioplasty: Prompt percutaneous repair of the infarction culprit artery (<12 h), routine (not rescue) and planned (non-emergency), in STEACS patients initially treated with drug therapy to achieve arterial opening.
20. Pharmacoinvasive strategy: Patients who having received a pharmacological strategy subsequently undergo coronary angiography.
21. Reperfusion Criteria: Evaluated at 120 min of fibrinolytic infusion or post TCA. It involves meeting two of three criteria (classic)
22. Acute renal failure: Impaired renal function accompanied by oliguria and elevated creatinine > 2.0 mg/dL
23. Post AMI angina: New anginal pain or its equivalent, with or without new changes in the ECG, which occurs between 24 hours and 30 days after AMI, and is not accompanied by enzyme release.
24. Recurrent angina: One episode of more than 20 min duration or two episodes lasting more than 5 min.
25. Refractory Angina: Presence of a recurrent episode of ischemic pain at rest of at least 20 min duration or two episodes of more than 5 min duration, associated with new electrocardiographic ST segment changes in the presence of maximal anti-ischemic treatment available in each center, and not meeting AMI criteria.
26. Acute myocardial infarction: Presence of a recurrent episode of ischemic pain of at least 20 min duration, with complete characteristic ischemic electrocardiographic changes and total CPK and/or its MB fraction elevation above twice the upper normal limit.
27. Reinfarction: The presence of at least two of the three conventional criteria was considered:
    a) Recurrent ischemic pain of 30 min or more duration.
    b) New ST-segment elevation in two or more contiguous leads or presence of new Q waves
    c) CPK re-elevation (≥ 50% elevation from the previous value)
28. Stroke: New neurological focus of more than 24 hour duration.
29. Major bleeding: According to TIMI major bleeding, according to GUSTO severe / moderate bleeding.
30. Minor bleeding: According to TIMI minor bleeding, according to GUSTO mild bleeding.
31. Total mortality: It includes all deaths regardless of etiology.

APPENDIX 2

Participating centers and investigators responsible for the SCAR registry

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Hospital Argerich: Dr. Piombo, Alfredo | Dr. Cozzarín, Alberto
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