

Epidemiological Study on Myocardial Infarction in the City of Pigüé

Estudio epidemiológico de infarto agudo de miocardio en la ciudad de Pigüé

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ABSTRACT

Background: Several registries on acute myocardial infarction (AMI) correspond to national multicenter studies or to cities with tertiary-care centers, but there is lack of continuous population-based registries reflecting the epidemiological reality of inland cities.

Objectives: The aim of this study was to determine the incidence, epidemiological characteristics, mortality and quality of care of AMI patients in the Saavedra-Pigüé district.

Methods: This prospective population-based study, performed from 1991 to 2012, recorded the epidemiological reality of Saavedra-Pigüé, a district in the Province of Buenos Aires lacking both prehospital emergency care services and near access to angioplasty facilities that impose the priority of thrombolytic reperfusion therapy.

Results: A total of 473 AMI were recorded (81.81% STEMI). Mean age was 63 ± 12.12 years and 31.71% were women. The incidence was 10.73 AMI per 10,000 population per year with an age-adjusted incidence (30-90 years) of 18.81 AMI per 10,000 population per year.

The overall in-hospital mortality was 9.93% and decreased to 6.81% in the period 2006-2012. When sudden deaths without resuscitation were not considered, the incidence of AMI was 10.73 per 10,000 population per year; 14.71 in men and 6.75 in women.

Conclusions: Knowing and describing our reality was a relevant information tool that allowed the implementation of health care policies to improve the quality of care of these patients.

Key words: Myocardial infarction - Epidemiology - Incidence - Suburban Population- Mortality

RESUMEN

Introducción: Si bien contamos con registros sobre infarto agudo de miocardio (IAM), los cuales corresponden a estudios multicéntricos nacionales o de ciudades con predominio de instituciones de alta complejidad, carecemos de registros continuos de base poblacional que reflejen la realidad epidemiológica de ciudades del Interior.

Objetivos: Determinar la incidencia, las características epidemiológicas, la mortalidad y la calidad de la atención de pacientes con IAM en el partido de Saavedra-Pigüé.

Material y métodos: Estudio poblacional, prospectivo, de 1991 a 2012, que registró la realidad epidemiológica del distrito bonaerense de Saavedra-Pigüé, sin servicio de emergencias prehospitalario y con distancias a hemodinamia que imponen la prioridad de perfusión con trombolíticos.

Resultados: Se registraron 473 IAM (81,81% IAMST). Edad media de $63 \pm 12,12$ años. El 31,71% eran mujeres. La incidencia poblacional de 10,73 IAM/10.000 habitantes/año, ajustada al grupo etario de 30 a 90 años alcanzó a 18,81 IAM/10.000 habitantes/año. La mortalidad hospitalaria global del 9,93% se redujo al 6,81% en el período 2006-2012. Descartando muertes súbitas sin atención médica, la incidencia poblacional fue de 10,73 IAM/10.000 habitantes/año; discriminada por sexo fue de 14,71 en hombres y de 6,75 en mujeres.

Conclusiones: Conocer nuestra realidad y describirla se constituyó en una herramienta de información relevante que permitió instrumentar políticas sanitarias para mejorar la calidad de atención de estos pacientes.

Palabras clave: Infarto del miocardio - Epidemiología - Incidencia - Población suburbana - Mortalidad

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Abbreviations

LBBB	Left bundle-branch block	STEMI	ST-segment elevation acute myocardial infarction
ECG	Electrocardiogram	SD	Sudden death
CRF	Cardiovascular risk factor	ACS	Acute coronary syndrome
AMI	Acute myocardial infarction	NSTEACS	Non-ST segment elevation acute coronary syndrome
NSTEMI	Non-ST-segment elevation acute myocardial infarction	STEACS	ST segment elevation acute coronary syndrome

INTRODUCTION

Cardiovascular diseases are the leading cause of death in developed countries and among them acute myocardial infarction (AMI) is one of the most significant entities. (1) In Argentina, cardiovascular diseases accounted for 29.5% to 30.7% mortality in the period 2005-2009. (2)

Most of the Argentine registries on this relevant health care problem correspond to national multi-center studies or to cities with tertiary-care centers, (8) but we did not find continuous population-based registries in the published literature. Therefore, we decided to collect prospective information in order to reflect the epidemiological reality of our district.

The goal of the present study was: 1) to establish the incidence of AMI in the district of Saavedra-Pigüé, 2) to determine its epidemiological characteristics, and, 3) to evaluate the outcomes of the health care system in the treatment of these patients in order to define health care policies.

METHODS

This 22-year-follow up population-based registry included the inhabitants of the district of Saavedra-Pigüé with AMI detected between January 1st, 1991, and December 31st, 2012.

The population studied was estimated at 19,407 inhabitants by the 1991 census, 19,751 in 2001 and 20,749 in 2010. (2)

Inclusion criteria

1. Patients with clinical and electrocardiographic diagnosis of acute coronary syndrome (ACS) during prehospital emergency care, with or without ST-segment elevation (STEACS or NSTEACS), and/or new or presumably new complete left bundle branch block (LBBB), even if they presented sudden death (SD) before hospital admission.
2. Patients hospitalized with electrocardiographic diagnosis of STEACS and/or new or presumably new complete LBBB or NSTEACS and positive biomarkers suggestive of non-ST-segment elevation acute myocardial infarction (NSTEMI) according to the traditional criteria to define AMI summarized in the consensus statement on ACS of the Argentine Society of Cardiology. (9)
3. Inhabitants of the district of Saavedra treated in hospitals outside the district, with confirmed AMI and subsequent follow-up in our district.
4. Outpatients detected by clinical history and signs of myocardial necrosis, confirmed by imaging tests.

Exclusion criteria

1. Patients in transit or temporarily living in the district, without definite residence.
2. Myocardial infarctions transferred from neighboring dis-

tricts to the intensive care unit of the Hospital Municipal de Pigüé.

3. Patients suffering from sudden death without medical care.

RESULTS

The density incidence was 10.73 AMI/10,000 inhabitants per year, with an important difference when discriminating by sex: 14.71 AMI/10,000 men per year and 6.75 AMI/10,000 women per year.

When only the age group between 30 and 90 years was considered, the incidence density rose to 18.81 AMI/10,000 inhabitants per year, with 27.06 AMI/10,000 men per year and 11.26 AMI/10,000 women per year.

The percentage of AMI cases in women was 31.71% with an average age 10 years higher than that of men (71.31 ± 10.52 vs. 61.35 ± 11.61).

Ninety-eight percent of the patients had one or more cardiovascular risk factors (CRF), with higher prevalence of hypertension and dyslipidemia. Smoking was more prevalent in patients <50 years and was present in 80% of the patients included in the registry. Sixty-six percent of the patients had three CRF or greater and only 8 patients (1.76%) did not present them.

More than half of the patients (56.45%) sought medical care within 6 hours since the onset of symptoms, 10.5% between 6 and 12 hours and 13.95% after 24 hours. Only 44.7% of patients arriving within the therapeutic time window received thrombolytic therapy. This percentage presented a significant increase after 2006, reaching 63.6% of patients arriving within the time window to receive thrombolytic therapy.

Average mortality was 9.93%, and a progressive reduction was noted, from 22.2% in 1990 when the study was designed to 6.81% in the 2006-2012 period.

DISCUSSION

Knowing the population incidence of AMI and its epidemiological characteristics has not only scientific interest, but also constitutes a relevant information tool for public health planning.

Studies from other countries, using the universal definition of AMI, show a decreasing trend of ST-segment-elevation AMI (STEMI) and an increase of NSTEMI, as well as a gradual decrease in mortality. For example, in Australia, (10) between 1993 and 2010 the incidence of all types of infarctions increased from 21.5 to 25.1 per 10,000 inhabitants, while STEMI fell from 14.7 to 7.0 and NSTEMI increased from

Table 1. Baseline characteristics of study population

Total n	473
Men, n (%)	323 (68.29)
Women, n (%)	150 (31.71)
M/F ratio	2,15
Age (mean±SD), years	63 ± 12.12
Men (mean±SD), años	61,35 ± 11.61
Mujeres (mean±SD), years	71,31 ± 10.52
Age intervals	
under 30 years, n (%)	2 (0.42)
31-40 years, n (%)	8 (1.69)
41-50 years, n (%)	53 (11.2)
51-60 years, n (%)	95 (20.08)
61-70 years, n (%)	134 (28.32)
71-80 years, n (%)	132 (27.91)
81-90 years, n (%)	45 (9.51)
90 years or more, n (%)	4 (0.84)
Coronary risk factors	
Hypertension, n (%)	325 (68.71)
Smoking, n (%)	170 (35.94)
Dyslipidemia, n (%)	292 (61.73)
Diabetes, n (%)	103 (21.77)
Obesity, n (%)	209 (44.19)
Sedentarism, n (%)	220 (46.51)
Family history, n (%)	183 (38.69)
History of coronary artery disease	
With time, n (%)	314 (66.38)
Previous AMI, n (%)	38 (8.03)
Chronic angina, n (%)	66 (13.95)
Recent onset angina, n (%)	137 (28.96)
Progressive angina, n (%)	45 (9.51)
Previous angioplasty, n (%)	12 (2.53)
Previous CABG, n (%)	16 (3.38)
Without time, n (%)	157 (33.2)
Silent AMI, n (%)	2 (0.42)

M: Male. F: Female. SD: Standard deviation. AMI: Acute myocardial infarction. CABG: Coronary artery bypass graft surgery.

6.7 to 18.2 cases per 10,000 inhabitants per year. In agreement with these results, a study from Worcester, (11) which includes the metropolitan area of Massachusetts (United States), reported a reduction of STEMI from 12.1 to 7.7 cases and an increase of NSTEMI from 12.6 to 13.2 per 10,000 inhabitants per year.

The results of the regional registries of 30 countries included in an analysis of the European Association of Percutaneous Cardiovascular Interventions (12) reported that the annual incidence of hospitalizations for any AMI varied between 9 and 31.2/10,000 inhabitants per year, while the incidence of STEMI alone ranged from 4.4 to 14.2/10,000 inhabitants per year.

In Spain, (13) the National Center of Epidemiology analyzed 19 studies published between 1993 and 2005 and found that the annual incidence of AMI ranged between 13.5 and 29 new cases per 10,000 men from 29 to 61 years and between 2.9 and 6.1 per 10,000 women from 25 to 74 years.

If we only consider STEMI, our numbers are coincidental or even higher than those reported by those studies over the past years, with an incidence of 8.82 cases per 10,000 inhabitants per year and similar to those obtained in the neighboring town of Coronel Suárez, (14) with 9.06 cases per 10,000 inhabitants per year.

One may wonder if these data really reflect the incidence of Argentina, or if they have a regional bias, as they were obtained in two adjoining districts of the province of Buenos Aires.

By analyzing other outcomes, it is striking that in a population that has no geographical barriers nor accessibility limitations to centers with hospitalization capabilities only 56.45% of patients arrived within six hours after symptom onset and 66.6% did so within 12 hours after symptom onset, a percentage lower than the one reported in surveys conducted by the Argentine Society of Cardiology between 1987 and 2005. (15)

Reperfusion with thrombolytic agents was considered a priority due to the distance to cardiac catheterization laboratories. As we have already mentioned, only 44.7% of patients arriving within the therapeutic window received fibrinolytic therapy, and this percentage increased to 63.6% after the implementation of the intensive care unit in 2006. In addition, a protocol was established for immediate transfer of patients with contraindications to treatment with streptokinase, absence of reperfusion signs or in cardiogenic shock.

Also, in-hospital mortality experienced a progressive decrease over the registry years due to the implementation of national policies for an easy transfer of patients to centers with cardiac catheterization laboratories and of the changes recommended by national and international guidelines. This reduction was reflected by an overall mortality of 9.93%, an optimistic number considering a mortality rate of 22% in 1990. Finally, mortality was 6.81% considering only the period 2006-2012.

Study limitations

The present study was designed in 1990; thus, one of the main limitations was the use of the classical definition of AMI (prolonged chest pain, new Q waves in the ECG and a twofold increase in cardiac enzymes above the maximal normal value). For this reason, STEMI only represented 18.18% of cases and increased to 21.8% in the period 2006-2012, significantly lower than the number reported by the international studies previously mentioned.

Another limitation is that we did not include ischemic SD (type III myocardial infarction) not treated by the health care team.

CONCLUSIONS

This epidemiological study reflects the situation in the “real world” of a district of the province of Buenos

Table 2. Admission clinical and electrocardiographic characteristics

Admission interval	
Less than 6 hours, n (%)	267 (56.45)
From 6 to 12 hours, n (%)	48 (10.15)
From 12 to 24 hours, n (%)	42 (8.88)
More than 24 hours, n (%)	66 (13.95)
Atypical or silent, n (%)	46 (9.72)
Post-CABG, n (%)	2 (0.42)
Post-PCI, n (%)	2 (0.42)
Killip y Kimball	
A, n (%)	258 (54.54)
B, n (%)	129 (27.27)
C, n (%)	48 (10.14)
D, n (%)	38 (8.03)
Typification	
Type Q AMI or STEAMI, n (%)	387 (81.81)
Men, n (%)	271 (57.29)
Women, n (%)	116 (24.52)
Non-Q AMI or NSTEMI, n (%)	86 (18.18)
Type T, n (%)	39 (8.24)
Type ST, n (%)	47 (9.94)
Men, n (%)	52 (10.99)
Women, n (%)	34 (7.19)
Infarct location	
Anterior, n (%)	166 (35.09)
Combined, n (%)	144 (30.44)
Inferior, n (%)	118 (24.9)
Lateral, n (%)	34 (7.18)
Undefined, n (%)	9 (1.9)
Posterior, n (%)	2 (0.42)
CLBBB on admission, n (%)	20 (4.23)

CABG: Coronary artery bypass graft surgery. PCI: Percutaneous coronary intervention. AMI: Acute myocardial infarction. STEAMI: ST-segment elevation acute myocardial infarction. NSTEMI: Non-ST segment elevation acute myocardial infarction.

Aires, where the health care system lacks the advances in technology and treatment approaches reported by the international and national literature. The latter demonstrates a certain publication bias or lack of registries.

The present study not only allowed us to know our reality and to describe it, but also constituted a relevant information tool that enabled the implementation of health care policies to improve the quality of care of these patients: implementation of a solid network of primary health care, work in interdisciplinary teams, and organization of the intensive care unit. A new central hospital was built in the district and was equipped with new technologies. Optimizing a prehospital emergency care system is still pending.

Conflicts of interest

None declared

(See author's conflicts of interest forms in the web / Supplementary Material)

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