Ischemic Heart Disease

Clinical Characteristics, Management, and Prognosis of Patients with Acute Myocardial Infarction Not Admitted to the Coronary Care Unit. Usefulness of an Intermediate Care Unit as the Initial Admission Site

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Introduction and objectives. There is little information about the management and prognosis of patients with acute myocardial infarction (AMI) who are not admitted to coronary care units (CCU) because of the lack of available beds. The aim of this study was to evaluate the characteristics and prognosis of the patients who were admitted to the intermediate care unit (INTCU) of a cardiology department.

Methods. We compared the clinical profile, management, and 12-month prognosis of the patients admitted to the INTCU or general ward (Ward) instead of the CCU.

Results. Out of 242 patients with AMI, 62 (23%) were not admitted to the CCU due to the lack of available beds. Of these, 29 (12%) were admitted to the INTCU and 26 (11%) to the Ward after being monitored for at least 24 h in the emergency room. Patients admitted to the CCU arrived at the hospital early, were younger, less frequently female, and had a lower prevalence of diabetes. ST-segment elevation AMI was more frequent in patients admitted to the CCU than in patients admitted to the INTCU or Ward (67 vs 17 and 23%, respectively; p < 0.0001), and non-Q wave AMI was less frequent (30 vs 76 and 81%; p < 0.0001). No differences were found between groups in the number of stress tests or revascularization procedures performed after the first 24 h, the duration of the hospital stay (median 8 days), or in-hospital mortality. The 12-month survival was 82, 80, and 64% in the patients admitted to the CCU, INTCU, or Ward (p < 0.05), respectively. These differences ceased to be significant after adjusting for the patients' baseline clinical profile and treatment received at admission.

Conclusion. Compared to patients with AMI admitted to the CCU, patients admitted to the INTCU or Ward after being monitored at least 24 h had non-ST elevation and non-Q wave AMI more frequently, but a less favorable risk profile for long-term mortality. The different types of AMI were managed similarly and had a similar 12-month prognosis. Intermediate care units may be useful for palliating the lack of CCU beds and care for some patients with AMI.

Key words: *Acute myocardial infarction. Acute coronary syndromes. Coronary care unit. Prognosis.*

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Perfil clínico, tratamiento y pronóstico de los pacientes con infarto agudo de miocardio no ingresados en una unidad coronaria: utilidad de una unidad de cuidados intermedios como lugar de ingreso inicial

Introducción y objetivos. Existe poca información sobre el tratamiento y el pronóstico de los pacientes con infarto agudo de miocardio (IAM) que, por falta de camas disponibles, no ingresan en la unidad coronaria (UCIC). El objetivo del estudio fue conocer las características y la evolución de estos pacientes en un servicio de cardiología que dispone de unidad de cuidados intermedios (UCINT).

Métodos. Se comparó el perfil clínico, el tratamiento recibido y el pronóstico a los 12 meses de los pacientes con IAM ingresados en una UCIC con los no ingresados, en función de que lo fueran en la UCINT o en sala de hospitalización convencional tras permanecer controlados en urgencias durante 24 h (sala).

Resultados. De un total de 242 pacientes con IAM, 62 (23%) no ingresaron en la UCIC por falta de camas, 29 (12%) ingresaron en la UCINT y 26 (11%) en sala. Los pacientes ingresados en la UCIC acudieron antes al hospital, tenían menor edad, había un menor número de mujeres y menos casos de diabetes. El IAM con elevación del segmento ST fue más frecuente entre los ingresados en la UCIC que en la UCINT o sala (67 frente a 17% y 23%; p < 0,0001), mientras que ocurrió lo contrario en los pacientes con IAM sin onda Q (30, 76 y 81%; p < 0,0001). No se observaron diferencias significativas en el número de pruebas de estrés realizadas, procedimientos

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ABBREVIATIONS

AMI: acute myocardial infarction.
IBERICA: Investigación, Búsqueda Específica y Registro de Isquemia Coronaria Aguda.
PRIAMHO: Proyecto de Registro de Infarto Agudo de Miocardio Hospitalario.
RESCATE: Recursos Empleados en los Síndromes Coronarios Agudos y Tiempos de Espera.
Ward: conventional hospital ward.
CCU: coronary care unit.
INTCU: intermediate care unit.

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de revascularización pasadas las primeras 24 h, estancia media (mediana, 8 días) ni en la mortalidad hospitalaria. La supervivencia a 12 meses fue del 82, 80 y 64% en los ingresados inicialmente en la UCIC, la UCINT o sala, respectivamente (p < 0,05), diferencias que dejaron de ser significativas tras ajustar por el perfil basal de los pacientes y el tratamiento recibido al ingreso.

Conclusión. En relación con los pacientes con IAM ingresados en la UCIC, los ingresados en la UCINT o en sala tenían con mayor frecuencia infartos sin elevación del segmento ST y sin onda Q, pero con un peor perfil de riesgo de mortalidad a largo plazo. Teniendo en cuenta las diferencias en el tipo de IAM, se les aplicó un número parecido de procedimientos diagnósticos y terapéuticos, y el pronóstico a 12 meses fue similar. Las unidades de cuidados intermedios pueden ser útiles para paliar el déficit de camas de la UCIC como lugar de ingreso inicial de algunos pacientes con IAM.

Palabras clave: *Infarto de miocardio. Síndrome coronario agudo. Unidad coronaria. Pronóstico.*

INTRODUCTION

Acute myocardial infarction (AMI) is still a disease with high mortality rate at the expense, specially, of it´s prehospitalization phase.[1] Intrahospital mortality has decreased significantly in the past few years due to the implantation of coronary care units, and to the widespread use of aspirin, fibrinolythics and coronary intervention. As a result, one-month mortality of AMI has fallen to 10%-15%.[2-4]

An important problem for optimal management of AMI patients in some hospitals is the unavailability of beds in coronary care units (CCU).[5] This causes many patients to be admitted in the emergency department or in the conventional hospitalization wards.[6-10] Consequently these patients may not receive adequate treatment, receive less diagnosis procedures and less therapeutical interventions of proved efficacy, and, as a result, mortality[8,9] is higher. Intermediate care units (INTCU) were created to early discharge uncomplicated patients from the coronary units before referring them to conventional hospitalization wards.[11] These INTCU may also play an important role in the initial admission of a number of patients with myocardial infarction, and should alleviate the saturated occupation rate of CCUs.

This study was designed to analyze clinical variables therapeutic strategies and outcome of AMI patients not admitted to a CCU due to the unavailability of beds. Results were analyzed depending on the site of admission: hospitalization wards, INTCU or CCU.

METHODS

We included all patients with the diagnosis of a classical myocardial infarction, with or without ST elevation, admitted to our hospital´s emergency department from June to December 2000. An AMI diagnosis was established when the following criteria were confirmed: a creatine kinase (CK) elevation over twice our laboratory´s maximum normality limit, a creatine kinase isoenzyme MB elevation over the maximum normality limit, and prolonged chest pain suggestive of coronary ischemia or appearance of new electrocardiographic (EKG) pathological Q-waves. Reinfarction occurring during hospitalization was diagnosed using the same criteria as for first infarction.

Two procedures were used to identify all AMI patients admitted to our hospital consecutively during the study: *a)* prospectively, in the cardiology department, and *b)* retrospectively, using the hospital discharge records. Patients with concomitant cardiomyopathy or vascular disease, patients referred from other hospitals due to post-infarction complications, and patients that died during the first hour, were excluded. During the study, none of the patients were referred to other hospitals.

Demographic, clinical and evolution variables were collected, as well as data from the diagnosis and therapeutical procedures applied. All variables were previously defined and their prospective coding was standardized using a registry record designed for this purpose. Data was analyzed in accordance to the initial admission location: the CCU, INT or ward; in the latter all the patients were monitored in an observation area of the emergency room during the first 24 h and afterwards referred to the ward, except 4 patients, discharged directly from the emergency room. One year after the acute episode, all patients were followed-up by a telephone interview.

Our hospital covers a health district of the city downtown with 400 000 inhabitants, plus a health district of more than one million subjects as a tertiary level referring institution. In the study period, 81 667 patients were admitted to the emergency room, with a daily average of 389 patients of which 121 accounted for medical emergencies. Chest pain was the cause of 10 to 15 of these medical emergencies. To manage all cardiovascular emergencies (acute coronary syndromes, severe heart failure, ventricular arrhythmias, heart transplantations, etc.), our CCU has 7 beds available. This number is, by all means insufficient to admit all patients who suffer an acute cardiovascular event. Alternatively, a 19 bed INTCU is available with seven individual beds and eight monitored beds. Finally, two beds are available in the emergency department in which treatment can be initiated for patients undergoing coronary revascularization but do not have a bed available in the CCU.[12]

As an established rule of the cardiology department, all AMI patients with ST elevation of less than 24 h from onset, and all patients with complicated infarctions, should be admitted to the CCU. When beds are unavailable at the CCU, the hospitalization order of preference is the INTCU, the cardiology ward and the internal medicine ward, respectively. No AMI patients of less than 24 h from onset were admitted in unmonitored beds. In our hospital, all patients with acute coronary syndromes are managed by internal residents of the cardiology department at admission.

Echocardiographic studies were performed to evaluate ventricular function and to discard concomitant valvular disease or cardiomyopathy, using a Hewlett-Packard SONOS 5500 ultrasound scanner. A conventional stress test (modified Bruce protocol) with or without an associated perfusion scintigraphy was performed after fourth day of admission to all patients who were clinically stable. Patients unable to perform a conventional stress test due to heart or physical limitations, were referred to a pharmacological stress test, (dypiridamole-perfusion scintigraphy or dobutamine-echocardiography).

After discharge, all patients were followed-up by telephonic interview. Total mortality was defined as the primary end-point.

Statistical analysis

Qualitative variables are summarized in absolute numbers and percentages, and quantitative variables are described as mean±SD or as median and intercuartile range if they do not follow a normal distribution. Variables were compared using the χ^2 test and analysis of variance (normal distributions), or the Kruskal-Wal-

lis test (non normal distributions). To address a potential association among disease severity and the clinical characteristics of patients admitted to each unit, data was compared with the trends association test. A value of $P<.05$ was considered significant.

Cumulative mortality during follow-up was calculated by Kaplan-Meier survival curves, using the log-rank test for comparison. The Cox proportional hazards method was used for adjusting confusion factors potentially related to the admission location and prognosis. For this purpose, variables present at admission that showed a $P<.10$ for the binary association to initial admission location and to one-year prognosis were included. These variables were: admission location, age, gender, diabetes, smoking, ECG changes, infarct location, Killip class at admission and revascularization therapy received, such as fibrinolysis or primary angioplasty. The relative risk (RR) of 95% with its confidence intervals (CI) was calculated, using the mortality of patients admitted to the CCU as reference. Data was analyzed with the SPSS version 10.0 software.

RESULTS

During our study period, 242 patients were admitted with an AMI diagnosis. A total of 180 patients were initially admitted to the coronary unit, 7 in the intensive care area, 29 in the intermediate care area, 18 in the cardiology department ward, 4 in an internal medicine department ward and 4 patients remained in the emergency department until discharge. For the purpose of study, patients were grouped by admission to the coronary intensive care units, to the conventional hospitalization wards or to the emergency department. A total of 187 patients (77%) were admitted to the CCU, 29 (12%) were admitted to the INTCU and 26 (11%) to the ward.

The median length of stay at the CCU was 3 (2-4) days, accounting for 2 (2-3) days in 102 (55%) uncomplicated AMI patients and 3.5 (2-5) days in the other patients. The main reason for non-admission to the CCU was the number of beds available in all cases except 3 patients. Reasons for non-admission to the CCU were old age in one patient and more than 24 h from onset of symptoms in the other two cases.

Clinical characteristics and therapies

Baseline characteristics of patients in each group are shown in Table 1. Patients admitted to the CCU arrived earlier to the hospital, were younger, less frequently women and with a lower prevalence of diabetes and smoking. A statistical significant trend for

admission location was observed for age, female gender, history of diabetes, smoking, EKG Q-waves, undetermined location infarctions and presence of bundle-left branch block. All these trends were towards a lower incidence in patients admitted to the CCU, more frequent in patients admitted to the INTCU, and most frequent in patients admitted to the ward (P trend value <.01; Table 1).

On the contrary, ST elevation at admission appeared much for frequently in patients admitted to the CCU (67% against 17% admitted to the INTCU and 23% to the ward; P<.0001), whereas ST depression was more frequent in patients admitted to the INTCU (52%). Left bundle-branch block appeared more frequently in patients admitted to the ward (19%). No significant differences at admission were found for the prevalence of arterial hypertension, hypercholesterolemia, previous infarct or Killip class.

Fibrinolysis treatment and primary or rescue angioplasty were performed almost exclusively for patients admitted to the CCU (Table 2). No significant differences between the three groups were observed relative to the number of exercise tests or of pharmacological stress tests performed. The number of echocardio-

graphic studies and catheterization procedures performed were not different among patients admitted to the CCU or the INTCU, but were higher in patients admitted to the ward (P<.0001). Mean ejection fraction was similar in all three groups. Treatment prescribed at discharge did not show significant differences related to the use of platelet aggregation inhibitors, beta-bloquering agents, calcium antagonists, or angiotensine converting enzyme inhibitors or the angiotensine receptor antagonists. Therapy using nitrates was more frequent in patients initially admitted to the ward (P<.01).

Outcome

The three groups presented a similar hospital stay length (mean 8 days). In this period, heart failure appeared in 32% of patients, ischemic complications appeared in 9%, and 10% died. The incidence of heart failure incidence was lower in patients initially admitted to the CCU and higher in those patients admitted to the ward (P=.01; Table 3). There were no significant differences in overall mortality among the three groups.

TABLE 1. **Clinical characteristics at admission**

	CCU N (%)	INTCU N (%)	Ward N (%)	P
Age, mean±SD	65±12	70±11	79±11	<.0001
Gender: female	42 (23)	8 (28)	15 (58)	.001
Risk factors				
Diabetes mellitus	53 (28)	15 (52)	14 (54)	<.01
Arterial hypertension	105 (56)	16 (55)	20 (77)	NS
Hypercholesterolemia	103 (55)	14 (48)	9 (35)	NS
Smoking	127 (68)	13 (45)	8 (31)	<.0001
History of previous myocardial infarction	41 (22)	7 (24)	7 (27)	NS
Time chest pain onset to admission, min*	120 (55-210)	165 (100-260)	158 (122-298)	<.05
EKG changes				<.0001
ST elevation	125 (67)	5 (17)	6 (23)	
ST depression	45 (24)	15 (52)	9 (35)	
Left bundle-branch block	5 (3)	2 (7)	5 (19)	
Other	11 (6)	7 (24)	6 (23)	
Non Q-wave myocardial infarction	56 (30)	22 (76)	21 (81)	<.0001
Infarct location				<.0001
Anterior	88 (47)	14 (48)	9 (35)	
Inferior	84 (45)	6 (21)	7 (27)	
Undetermined	14 (8)	9 (31)	10 (39)	
Killip class				
I	140 (75)	26 (90)	16 (62)	NS
II	17 (9)	1 (3)	5 (19)	
III	19 (10)	2 (7)	5 (19)	
IV	11 (6)	0	0	

*Median (25-75 quartile values); NS indicates non significant; EKG, electrocardiographic; CCU, coronary intensive care unit; INTCU, intermediate care unit.

TABLE 2. **In-hospital treatment and diagnosis procedures**

	CCU N (%)	INTCU N (%)	Ward N (%)	*P*
Fibrinolysis at admission	76 (41)	0	2 (8)	<.0001
Primary angioplasty	23 (12)	0	0	<.01
Rescue revascularization	12 (6)	0	0	NS
Diagnosis tests (n=226)				
Exercise test	42 (24)	4 (14)	3 (12)	NS
Stress scintigraphy	49 (29)	10 (35)	4 (15)	NS
Stress echocardiography	4 (2)	0	1 (4)	NS
Echocardiography	172 (92)	28 (97)	14 (54)	<.0001
Ejection fraction, %	45±11	45±11	45±16	NS
Coronary angiography	97 (52)	12 (41)	3 (12)	<.0001
Angioplasty/coronary surgery	59 (32)	6 (21)	2 (8)	<.05
24 h from onset	24 (13)	6 (21)	2 (8)	NS
Therapy at discharge				
Aggregant inhibitors	154 (92)	29 (100)	22 (100)	NS
Betablokers	100 (60)	17 (61)	8 (36)	NS
Nitrates	34 (20)	16 (57)	13 (59)	<.0001
Calcium antagonists	25 (15)	5 (17)	6 (27)	NS
ACE inhibitors/ARA-II	78 (46)	13 (46)	13 (59)	NS
Statins	68 (41)	18 (64)	4 (18)	<.01

CCU indicates coronary intensive care unit; INTCU, intermediate care unit; ACE inhibitors, angiotensine converting enzyme inhibitors; ARA-II, angiotensine type II receptor antagonists; PE, stress test; NS, non significant.

During a mean follow-up of 12 (10-15) months, 46 patients (19%) died. Cumulative survival at 12 months was 82% of patients admitted initially to the CCU, 80% of patients admitted to the INTCU, and 64% of patients admitted to the ward (*P*<.05; Figure 1). By multivariate Cox regression analysis, adjusting the remaining variables, there were no significant differences to be found in one-year mortality relative to initial admission location. As compared to patients admitted in the CCU, the relative risk of patients admitted to the INTCU was 0.80 (95% CI, 0.28-2.3) and 0.57 (95% CI, 0.21-1.54), respectively (NS).

DISCUSSION

Our study demonstrates that when CCU beds are unavailable, intermediate care units can be useful for admitting initially some AMI patients once a correct treatment is initiated in the emergency department. This should allow a better selection of patients to be admitted directly to conventional hospitalization wards after ECG monitorization is continued at least during 24 h.

The optimal occupancy rate for a CCU has already been demonstrated should be less than 75%[11] to allow a number of beds to be always available. The real sce-

TABLE 3. In**trahospital evolution**

	CCU N (%)	INTCU N (%)	Ward N (%)	Ward *P*
Stay, days*	8 (6-12)	7 (6-8.5)	7 (5.2-8.8)	NS
Heart failure	62 (33)	3 (10)	12 (46)	.01
Killip Class (maximum)				
I	131 (70)	26 (90)	14 (54)	.09
II	15 (8)	1 (3)	5 (19)	
III	20 (11)	2 (7)	4 (15)	
IV	21 (11)	0	3 (12)	
Recurrent angina	16 (9)	3 (10)	1 (4)	NS
Reinfarction	1 (1)	0	1 (4)	NS
Mortality	20 (11)	0 (0)	4 (15)	NS

*Median (percentage value 25-75). CCU indicates coronary intensive care unit; INTCU, intermediate care unit; NS, non significant.
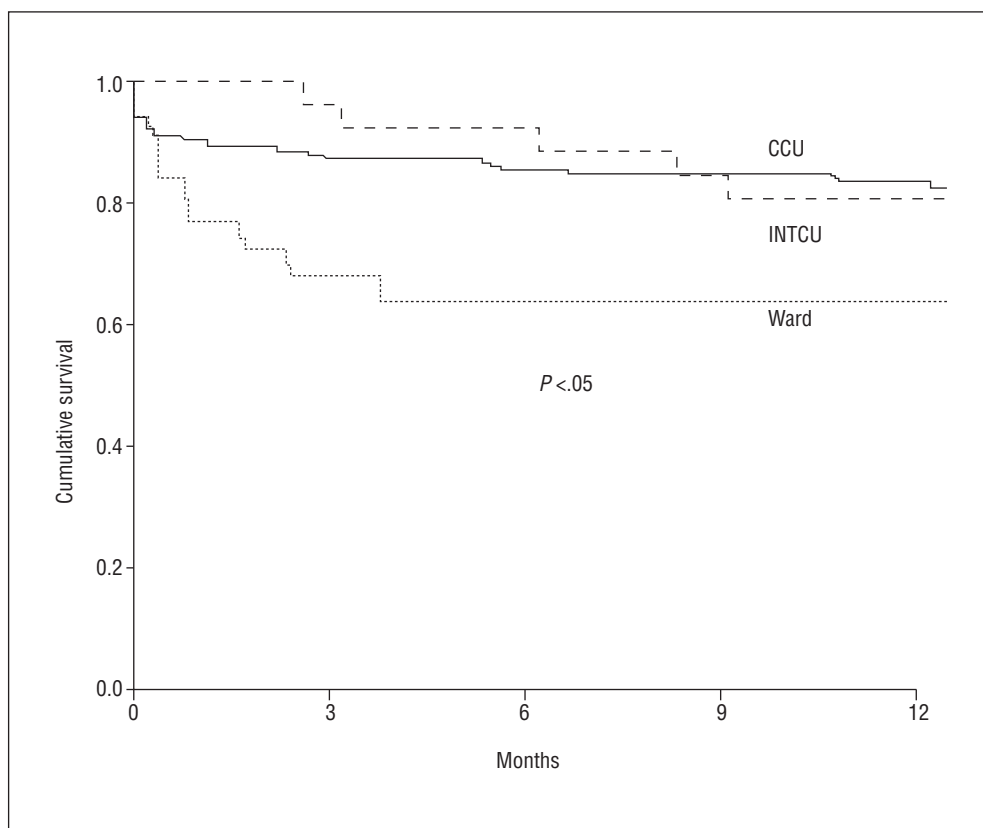
Fig. 1. Survival curves to one year of AMI patients as a function of admission location. CCU indicates coronary intensive care unit; INTCU, intermediate care unit; Ward, conventional hospitalization ward.

nario, unfortunately, is somewhat different, and occupancy rates are usually near 100%. This frequently hinders access of many AMI patients to the coronary intensive care units. Admission to CCUs has been progressively restricted following variable criteria depending on hospital characteristics, existing resources, CCU types, and particularly, the assistance pressure.

Prevalence of AMI patients not admitted to the CCU

How frequently patients with AMI are not admitted to the CCU is not well known. In a USA based study, frequency was 10%,[13] although other studies in Spain indicate a variable frequency between 11% and higher than 35%,[6-10] depending on the patients selected, type of hospital, resources available, and data collection accuracy. In a 1988-1989 study carried out in a tertiary level hospital, the rate was 22%,[6] similar to our results. In the RESCATE[7] registry, created in 1992-1994, it accounted for 17% of the 1471 patients that met inclusion criteria, of a total number of 3929 patients. The registry of myocardial infarction performed by the Section of Ischemic Heart Disease of the Sociedad Española de Cardiología in the year 1995,[8,14] described that 22% of patients were not admitted to the CCU.

Half of these patients were admitted to the cardiology department wards and the other half to other departments. It was mandatory for participating in this registry that the institutions had a CCU with a coverage rate (percentage of patients in CCU/total admissions) higher than 70%. This study did not specify how many of these patients were discharged directly from the emergency department. In another study, a 35% of AMI patients were never admitted to the CCU or the cardiology department; 15% remained in the emergency department and 20% were referred to other secondary level hospitals.[9] In the IBERICA[10] study carried out in 1997 among patients of less than 75 years, 11% were not admitted to a CCU. Important variations were observed among autonomous regions in the country, in a range from 2.3% to 21%. Finally, in the recently published registry of acute coronary syndromes performed by the European Society of Cardiology (data from 103 hospitals of 25 countries), 21% of patients suffering acute coronary syndromes and ST elevation were not admitted to the CCU.[15]

Profile of patients not admitted to CCU

The lack of specific beds for patients with acute diseases makes adaptation necessary.[13] Frequently diffi-

cult decisions are taken to choose the least worst option. A potential solution is to shorten the average stay of uncomplicated AMI patients[5] in the CCU, as in our study. When this does not prove effective, various systems have been developed to adapt bed unavailability at the CCU: admission directly to the cardiology department[6] or internal medicine department wards; admission to short-term units next to the emergency department, where patients await their discharge or referral to another hospital.[9] In the long term, this type of units, where patients suffering higher risks and mortality are addmitted,[7-9] change into oversized parallel coronary intensive care units, with fewer technical resources available and without qualified personnel.

As an exception to the study of Anguita et al,[6] most of the studies that also analyze this problem emphasize that patients not admitted to a CCU are usually older,[7-9,16] with a majority of female patients, and a with a higher rate of heart failure and comorbidity.[9] Our study disclosed a severity gradient of baseline characteristics depending on the admission location of patients. These baseline characteristics included age, female population and prevalence of diabetes, with a lower hazard profile for patients admitted to the CCU, somewhat higher for those admitted to the INTCU, and even higher for patients admitted to the ward. Also, the analysis of admission EKG data showed that patients admitted to the CCU had three times higher incidence of ST segment elevation. Patients admitted to the INTCU and the ward, had mostly (75%) non Q-wave myocardial infarctions. The time from onset of symptoms was noticeably longer in these patients. As a result, patients with a priori predictors of worse long-term prognosis were admitted to the INTCU or the ward, whereas patients showing admission predictors of worse short-term prognosis were admitted to the CCU. This allows this patient group to take best advantage of revascularization procedures.

Medical human factors determine the variations in clinical practice. Medical protocols define the admission criteria and patient selection for establishing diagnosis and therapeutic procedures. In such judgments, specially for elderly patients, frequently associating comorbidity and social problems, there is frequently a biased discrimination.[17] In general, AMI patients not admitted to the CCU usually present a higher risk baseline clinical profile. Frequently less diagnosis and therapeutical procedures[6,9] are performed on these patients. Also, well established therapeutic interventions such as fibrinolythics,[6,8] coronary angiography, coronary revascularization procedures[6,9] and betablocking agents at discharge are used less frequently.[9] On the contrary, in our study the admission location did not condition the diagnostic or therapeutical procedures.

However, percutaneous revascularization procedures were used more frequently in patients admitted initially to the CCU due to their three-fold prevalence ST elevation AMIs.

Intrahospital evolution and mortality to one year

In our study, the admission location did not condition the median stay of patients either, accounting to 7-8 days in the three groups. In this period, no differences were observed relative to the incidence of recurrent angina or reinfarction. Heart failure occurred more frequently in patients admitted to the ward, probably as an effect of their older average age. Despite the differences previously described in patients with acute risk, intrahospital mortality was similar in the 3 groups. This suggests a correct application of available resources at our institution according to patient and disease characteristics. We would like to emphasize that our results are particularly favourable due to the availability of a INTCU. Although patients admitted to the INTCU, were older (median of 70 years) and with a higher prevalence of diabetes than CCU patients, no patient died.

Our results are similar to those of a number of previous studies and differ from others. As in the studies of Anguita et al[6] and Selker et al,[13] and as in the RESCATE[7] and PRIAMHO[8] registries, intrahospital evolution was similar in patients admitted or not to the CCU. Nevertheless, in-hospital outcome is known to be relatively good for patients that survive the first hours. Therefore, it should be essential to analyze their prognosis at a longer term to study this situation correctly. In our study, one-year mortality of patients admitted initially to the ward was higher than in patients admitted to the INTCU and CCU, although differences disappeared after adjusting the patient's baseline characteristics.

Only one previous study has analyzed the long term prognosis of AMI patients admitted or not to a CCU.[9] This study demonstrated that one year mortality of patients that remained in the emergency department during their entire hospital stay was 61%, significantly higher than the 29% observed in patients referred to other hospitals, and 17% in patients admitted to the CCU or the ward. Multivariate analysis showed that non-admission to the CCU or the ward, was independently associated with a one year mortality 17 times higher. In this study, the mean age of the whole study group and of patients that remained in the emergency department (67 and 77 years old, respectively) was very close to the ages of our series for the whole population and for the group admitted to the ward (67 and

79 years old, respectively). As stated by the authors, mortality differences observed between admission locations question the suitability of their admission criteria. Also their increased mortality observed in non-CCU patients lead to an important debate on the balance between available resources and attendance philosophies for assisting the population with AMI, particularly the elderly patients. Our study suggests that the implementation of a INTCU, together with clearly established admission criteria, can be very useful to manage AMI patients correctly at admission when beds are unavailable at the CCU.

Despite the good results our study obtained about the initial management of AMI patients in an INTCU, it is known that the aims and equipment of these units are not the same than in a CCU. Therefore INTCU should be only understood as complementary. Improvements in efficacy of the CCU can be accomplished when a well coordinated INTCU is also available, allowing referral to another institution of most patients after 24-48 h. Hence, INTCU and CCU are complementary units, but not interchangeable.

Study characteristics and limitations

Our study is designed observational. Patients were not assigned randomly to the admission locations following predefined inclusion and exclusion criteria. Consequently, our study cannot establish a cause-effect relationship. Nevertheless, the usefulness of the CCU for treating AMI patients during the first hours has been widely confirmed,[2,3,18-20] and a randomized trial study would be unethical. Our results cannot be extrapolated to all institutions either. This issue is of particular concern for patients admitted to the ward. Our results should be understood as a consequence of the availability of an intermediate care unit, in a hospital in which all patients suffering an acute coronary syndrome are attended by cardiology fellows. Also resources are sufficiently available to perform diagnosis and therapeutical procedures to all patients with infarction, whichever might be their admission location. Also, a small number of patients were studied, and therefore, larger studies are warranted.

CONCLUSIONS

For AMI patients not admitted to a coronary unit due to unavailability of beds, a strategy of EKG monitoring during at least 24 h, usage of an intermediate care unit, and application of clear risk stratification and therapeutic protocols, allows to establish the location of admission without jeopardizing medical aid or long term prognosis.

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