

Diagnosis of chest pain in the emergency room: is the approach different for men and women?

ALBA RIESGO, ERNEST BRAGULAT, BEATRIZ LÓPEZ-BARBEITO, MIQUEL SÁNCHEZ, ÒSCAR MIRÓ

Emergency Department, Hospital Clínic, Barcelona, Spain.

CORRESPONDENCE:

Dr. Òscar Miró
Àrea d'Urgències
Hospital Clínic
Villarroel 170
08036 Barcelona, Spain
E-mail: omiro@clinic.ub.es

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None

Objective: To assess whether the diagnosis of chest pain is approached differently in men and women attending hospital emergency services.

Method: Patients who were treated consecutively in the chest pain unit of a hospital emergency department over a period of 16 months were studied. After the preliminary examination and electrocardiogram (ECG), patient assessment followed 1 of 4 protocols: P1, acute coronary syndrome (ACS) with ST elevation; P2, ACS with ST depression; P3, chest pain with probable ACS but a normal or inconclusive ECG; and P4, chest pain unrelated to ACS. Gender was the dependent variable. The independent variables were time from arrival at the door of the emergency room until the first ECG (t1) for each protocol; the admitting department for P1 and P2 patients; and the percentage of patients in whom troponin was measured twice and a stress test was ordered, door arrival to discharge time (t2), and door arrival to stress test time (t3) for P3 patients. Variables that were significantly different between genders were studied further with the population stratified by age and risk score for thrombosis in myocardial infarction (TIMI).

Results: A total of 4568 patients were attended (5% P1, 8% P2, 46% P3, 41% P4). Forty-five percent were women. The mean (SD) ages were 74 (18) years for women and 58 (18) years for men ($p<.001$). Sixty-three percent of women and 47% of men had a TIMI risk score less than 2 ($p<.001$). The median t1 was longer for women than men in all protocols (P1, 7 minutes vs. 5 minutes, respectively, $p=.06$; P2, 12 vs. 9 minutes, $p=.15$; P3, 15 vs. 13 minutes, $p<.01$; P4, 21 vs. 19 minutes, $p=.25$). Women were admitted to intensive or intermediate care units less often than men (36% vs. 62%, $p<.001$) and stress tests were less often ordered for them (33% vs. 39%, $p<.01$). The only difference that remained after stratifying by age was a lower percentage of intensive or intermediate care unit admission for women between 71 and 80 years of age and fewer stress tests for women between 81 and 90 years old. Many differences also disappeared after stratifying by TIMI risk score. Women with TIMI risk scores less than 2 were less often admitted to intensive or intermediate care units than men (15% vs. 43%, $p<.01$); those with scores between 3 and 4 were less often scheduled for stress tests (23% vs. 33%, $p=.04$).

Conclusions: The diagnosis of chest pain in this hospital emergency department seems to be less energetically pursued in women; however, many of the differences initially observed disappear when the population is stratified by age and TIMI risk score. [Emergencias 2008;20:399-404]

Key words: Chest pain. Gender. Emergency Service, Hospital.

Introduction

Non-traumatic thoracic pain is a frequent reason for attending hospital emergency departments (HED) and in some urban environments can account for up to 11.9% of HED visits¹. Fifteen percent of these visits are cases of acute coronary syndrome (ACS) which can be confirmed by the clinical symptoms and the performance of an electrocardiogram (ECG), and may

constitute up to an additional 35% of inclusion of cases of ACS presenting a normal initial ECG. In recent years, HED have created thoracic pain units (TPU) to improve the accuracy and cost-effectiveness of diagnosis. Besides optimising attention, these units prevent lethal effects from treatment delay and inadequate discharge of patients with ACS²⁻⁴.

Despite all the effort made to achieve the correct diagnosis, cardiovascular conditions and most

particularly ischemic cardiopathy, continue to occupy the top position in the list of causes of death among women⁵. If we combine this fact with the type of clinical assessment that women with thoracic pain undergo in HED, we can understand why certain doubts arise concerning medical attention given nowadays to this population⁶⁻⁹. On one hand, these doubts are promoted by the difficulty for diagnosing non-traumatic thoracic pain in women, especially during menopause, as more care is demanded at this stage of life and there is a higher frequency of somatisation in the form of pain that can be attributed to different anxiety processes. On the other hand, there is a documented lower percentage of performance of primary angioplasty and percutaneous or surgical revascularisation in relation to men⁶⁻⁸.

As a substantial part of the initial management of thoracic pain takes place in the HED, some of these differing aspects between men and women could have their origin in this first approach. This study analyses some of the aspects of thoracic pain management in an HED depending on the patient's sex.

Methods

The present study was carried out in a structural TPU of a third-level HED. The characteristics of this department have been described above¹. Data are collected in specific computerised medical records from which they are passed on to a database designed for the statistical management of results. Following recommendations of the Spanish Society of Cardiology¹⁰, after the first assessment in the HED and according to the findings in an initial ECG, patients are classified into four protocols: protocol 1 (P1; ACS with ST-segment elevation or ACSSTE), protocol 2 (P2, ACS without ST-segment elevation or ACSWSTE), protocol 3 (P3, probably coronary thoracic pain with normal ECG or no diagnosis) and protocol 4 (P4, non-coronary thoracic pain). Patients in P1 and P2 are always assessed by the on-call cardiologist, who decides on their therapeutic management and in general terms, indicates patient admission. Patients in P3 are managed initially by the emergency physician who in the case they present a negative troponin curve, they request an exercise stress test. Patients in P4 are managed solely by the emergency physicians according to their diagnosis.

The study was conducted during 16 months (from January 2006 to March 2007, inclusively).

Table 1. Prognosis classification of acute coronary syndrome without ST-segment elevation according to TIMI risk score

Age \geq 65 years
3 or more cardiovascular risk factors
Use of aspirin in the last 7 days
Known history of ischaemic cardiopathy (stenosis \geq 50%)
2 or more episodes of angina in the last 24 hours
ST-segment depression ST \geq 1 mm
Elevation of cardiac troponins
Score: 0-2 low risk; 3-4 moderate risk; 5-7 high risk.

During this period, all patients seen at the TPU were included in the study. Sex was considered the dependent variable. The time from arrival at the HED to the performance of an ECG, was considered as an independent variable for patients in all four protocols (t1). In addition, patients in P1 and P2 (in these patients admission to hospital is normally recommended) the units to which they were admitted were also considered (intensive care or intermediate care units versus conventional hospitalisation units). For patients in P3 (managed mostly at the emergency department) we also considered the percentage of individuals who underwent a double determination of troponin levels and exercise stress test, time arrival at the from HED to discharge (t2) and time from arrival at the HED to performance of an ECG (t3). Among those patients classified into P2 and P3, the TIMI risk score was collected for those with ACSWSTE. This classification is based on clinical symptoms, type of ECG and markers of myocardial necrosis. Its use as a prognosis classification tool is widespread¹¹. It consists of 7 variables that can be obtained easily at the patient's bedside (Table 1).

Results are shown with the median values (interquartile range) for the quantitative variables and in percentage for the categorical variables. The Mann-Whitney U test was used for comparing sexes for the quantitative variables and the chi-square was used for categorical variables. In cases where significant differences, classification was made by age and TIMI risk score. Statistical significance was considered with a *p* values less than 0.05.

Results

During the study period, 4568 patients were seen at the TPU. After the first ECG, 216 (5%) presented ACSSTE, 357 (8%) presented ACSWSTE, 2111 (46%) reported probable coronary pain or P3 and 1884 (41%) referred non-coronary pain or P4, and 45% were women with a mean age of

Table 2. Comparison of the main parameters for men and women

	Women	Men	p
Time elapsed between arrival to the HED and performance of ECG (t1, in min.)			
– P1	7 (18)	5 (15)	0.06
– P2	12 (29)	9 (23)	0.15
– P3	15 (29)	13 (26)	0.01
– P4	21 (32)	19 (28)	0.25
Time elapsed between arrival to the HED and discharge in discharged P3 patients (t2, in min.)	394 (338)	397 (320)	0.89
Time elapsed between arrival to the HED and performance of exercise stress test in P3 patients (t3, in min.)	1380 (2520)	1200 (2160)	0.09
P1-P2 Patients admitted to intensive/intermediate care units (%)	62	36	0.001
P3 Patients with a complete troponin curve (%)	73.9	73.8	0.96
P3 Patients with exercise stress test scheduled (%)	33	39	< 0.01

*t1, t2 and t3 are shown as median values (interquartile range).

74 ± 18 years, being significantly higher than the mean age of the men 58 ± 18, ($p < 0.001$) than 2 in 63% of the women also significantly differing from that of the men in which only 47% had a TIMI risk score less than 2 ($p < 0.001$).

t1 was higher for women in all protocols but was only statistically significant for patients in P3 (13 vs. 13 minutes; $p < 0,01$; Table 2), with no significant differences between sexes in t2 and t3.

As can also be seen in Table 2, in comparison to men, women were less frequently admitted to intensive care and intermediate care units (36% vs. 62%; $p < 0.001$). No find differences between sexes in the percentage of patients in which the enzyme curve was completed although differences were detected in the percentage of exercise stress tests performed (33% vs. 39%; $p < 0.01$).

When classifying results by age (Table 3), most significant differences disappear. Only a higher t1 was found for women aged 71 to 80 (14 vs. 11 minutes; $p < 0.05$), a lower percentage of admis-

sions to intensive/intermediate care units in women aged 71 to 80 (29% vs. 60% $p < 0.01$) and fewer exercise stress tests performed in women aged from 81 to 90 (14% vs. 24%; $p < 0.05$).

Similarly, when classifying results by TIMI risk score (table 4), many of these differences also disappear. However, for the low-risk group (TIMI < 2) a lower percentage of admissions to intensive/intermediate care units was reported in women (15% vs. 43%; $p < 0.01$) and for the moderate-risk group (TIMI 3 to 4) there was a lower percentage of performance of exercise stress tests (23% vs. 33%; $p = 0.04$).

Discussion

Previous studies show that there are clear differences in the treatment of ACS given to men and women. However, is was not considered

Table 3. Classification of significant parameters by age

	Women	Men	p
Time from arrival to the HED to performance of ECG in P3 patients (t1, in min.)			
– Less than 60 years	17 (29)	13 (27)	0.07
– 61 to 70 years	17 (36)	14 (23)	0.32
– 71 to 80 years	14 (30)	11 (28)	0.04
– 81 to 90 years	12 (23)	12 (24)	0.89
– More than 90 years	27 (37)	20 (29)	0.14
P1-P2 Patients admitted to intensive/intermediate care units (%)			
– Less than de 60 years	62.5	72.5	0.51
– 61 to 70 years	42.8	60	0.06
– 71 to 80 years	29.4	59.7	< 0.01
– 81 to 90 years	29.4	26	0.82
– More than 90 years	0	0	0.97
P3 Patients with scheduled exercise stress test (%)			
– Less than 60 years	48.1	49.7	0.72
– 61 to 70 years	50.7	46.1	0.43
– 71 to 80 years	31.8	27.7	0.33
– 81 to 90 years	13.9	23.5	< 0.05
– More than 90 years	0	7.6	0.21

*t1 expressed as median (interquartile range).

Table 4. Classification of significant parameters by TIMI risk score

	Women	Men	p
Time from arrival to the HED to performance of ECG in P3 patients (t1, in min.)			
– Low risk (TIMI: 0-2)	15 (28)	13 (26)	0.65
– Moderate risk (TIMI: 3-4)	14 (29)	12 (27)	0.22
– High risk (TIMI: 5-7)	–	–	–
P2 Patients admitted to intensive/intermediate care units (%)*			
– Low risk (TIMI: 0-2)	15	43	0.01
– Moderate risk (TIMI: 3-4)	25	43	0.07
– High risk (TIMI: 5-7)	0	33	–
P3 Patients with scheduled exercise stress test (%)			
– Low risk (TIMI: 0-2)	36	42	0.09
– Moderate risk (TIMI: 3-4)	23	33	0.04
– High risk (TIMI: 5-7)	–	–	–

*Patients in P1 were not considered as the TIMI risk score was obtained for these patients in a different way than for those in P2.

whether these differences already arise at the initial management of patients in the HED⁶⁻⁹. The present study is the first in Spain to focus on analysing whether there are differences in the treatment given to men and women with non-traumatic thoracic pain in a HED with a structural TPU.

On analysing the whole population of patients treated in the TPU, it can be seen that these differences do, in fact, exist. In this sense, the time from arrival at the HED and the performance of an ECG was longer for women as a group, although there was only a significant difference in those women in which ACS is suspected and have a normal ECG (P3). The management of thoracic pain in men and women is different as women present certain specific problems¹². It is present more frequently for women to atypical thoracic pain due to a higher prevalence of less common causes of thoracic pain such as vasospasm or microvascular angina and syndromes that generate non-ischaemic thoracic pain such as mitral valve prolapse. Hormones constitute a crucial factor and menopause is currently recognised as a risk factor that is independent from age and that has a similar relevance than male gender. The presence of diabetes is a predicting factor of coronary disease which is more important in women and more common among those with coronary disease compared to men.

In this group of women we can also see a significant difference in the number of exercise stress tests carried out as well as a longer delay in their performance, although this delay was not statistically significant. These differences must be attributed solely to the actions of emergency physicians as these patients are mainly managed without the participation of cardiologists. A possible explanation for this is that the basic test in the diagnosis

and assessment of thoracic pain, the conventional cardiac stress test, has a lower performance in women for some of the following reasons: obesity, polyarthrosis, chronic venous insufficiency, low functional capacity/ability or an inability to reach high heart rates. Unfortunately, there was no parallel record of alternatives used in women as tests for inducing ischaemia. This means that what has really been proved in the present study is a reduction in the percentage of performance of conventional cardiac stress tests without being able to dilucidate if in turn, in compensation, the performance of other ischaemia inducing tests – which are also available by scheduled appointment in our TPU – was higher.

As mentioned above, these differences could be due to a higher frequency in the atypical presentation of pain among women and at an older age¹². Although the first aspect is not analysed in the present study, we confirmed the second as most differences disappear when classifying results according to age. It is well-known that in Spain women have a higher life expectancy (87 vs. 83 years) and that mortality by ischaemic cardiopathy despite having it lowered for both sexes in recent years, constitutes the first cause of death in men (12% of total) while it is the second most common cause for women (10%)¹³. Therefore, when age is considered for classifying results, differences persist only in time from arrival at the HED to performance of ECG among women aged 71 to 80 and in scheduling of exercise stress tests for women older than 80. This last difference is probably due to the greater difficulty for these patients to undergo a conventional exercise stress test as their mobility is limited. In Spain, between 10 and 20% of people older than 72 are not able to walk without assistance and they present difficulties for carrying out everyday life activities.

Moreover, those who are older, women, widows and widowers, those with a lower level of studies and those who present a worse self-assessed health state tend to be more dependent¹⁴. It must also be pointed out that many differences disappeared when classifying results by TIMI risk score. However, when the TIMI presents intermediate values, significant differences persist as there is less diagnostic invasion in women. Therefore, it would be advisable to investigate the causes producing this.

It is also relevant that men, regardless of age and TIMI risk score, show a clear tendency to be admitted more frequently into intensive care and intermediate care units than women, although this difference is only statistically significant for those individuals aged 71 to 80 and in the low-risk group. In contrast with the findings discussed above, this difference can not be attributed to the initial management of thoracic pain in the HED by the emergency physician, as the final destination of patients within the hospital is not decided by them but by the cardiologist. The availability of hospital resources, which is always short and limiting, should not justify the different assignation of hospitalisation rooms in terms of sex, although the causes for these findings have not been analysed in this study.

Therefore, the objective data to date are that the number of both invasive – revascularisation – and non-invasive – cardiac stress test, perfusion studies – procedures is lower in global figures and in the percentages on comparing women with men. In previous studies, the diagnostic approach was found to be less aggressive for women than for men despite women being older on average when they attend the HED referring thoracic pain and they present other co-morbidities /pathologies more frequently – high blood pressure and peripheral vascular disease. However, it has been observed that there are no differences in terms of mortality rates during the first year, probably due to coronary disease being more prevalent in men than in women. Possible explanations could be that women present more frequently with no diagnosis or normal ECG and an atypical clinical presentation¹⁵.

In conclusion, in the context of a TPU within a HED with a defined policy for initial emergency management of non-traumatic thoracic pain, there are no great differences globally in terms of sex regarding the approach carried out by the emergency physician. We believe that the differences detected in some of the age groups or in the TIMI risk score groups in the number of exer-

cise stress tests performed in the older age group are probably not due to the different approach to the pathology but to a physical difficulty in patients to perform the test. These data confirm the need to develop TPUs in the HEDs in Spain as, among other advantages, in these units guarantee treating thoracic pain can be treated equally in men and women.

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Aproximación diagnóstica del dolor torácico en urgencias: ¿existen diferencias entre mujeres y hombres?

Riesgo A, Bragulat E, López-Barbeito B, Sánchez M, Miró O

Objetivo: Valorar si existen diferencias en la aproximación diagnóstica del dolor torácico en un servicio de urgencias hospitalario (SUH) en función del género.

Método: Pacientes consecutivos visitados en la unidad de dolor torácico de un SUH durante 16 meses. Tras la primera valoración y el electrocardiograma, los pacientes se clasificaron en cuatro protocolos diferentes: P1 (síndrome coronario agudo (SCA) con elevación del ST); P2 (SCA con descenso del ST); P3 (dolor torácico probablemente coronario con electrocardiograma (ECG) normal o no diagnóstico) y P4 (dolor torácico no coronario). La variable dependiente fue el género, y las independientes el tiempo puerta-ECG (t1) para cada protocolo; en P1 y P2 el lugar de ingreso del paciente; y en P3 los porcentajes de pacientes a los que se les hizo doble determinación de troponina y prueba de esfuerzo y los tiempos puerta-alta (t2) y puerta-prueba de esfuerzo (t3). En las variables en que se hallaron diferencias significativas, se estratificó por edad y TIMI.

Resultados: Se visitaron 4.568 pacientes (5% P1, 8% P2, 46% P3, 41% P4). El 45% fueron mujeres, con una edad media de 74 ± 18 años (varones 58 ± 18 años; $p < 0,001$) y un TIMI menor de 2 en el 63% de ellas (varones 47%; $p < 0,001$). El t1 (mediana, en minutos) fue superior en las mujeres en todos los protocolos (P1: 7 vs 5, $p = 0,06$; P2: 12 vs 9, $p = 0,15$; P3: 15 vs 13, $p < 0,01$; P4: 21 vs 19, $p = 0,25$). Las mujeres ingresaron con menor frecuencia en las unidades de cuidados intensivos o intermedios (36% vs 62%, $p < 0,001$) y se les solicitaron menos pruebas de esfuerzo (33% vs 39%; $p < 0,01$). Al estratificar por edad, sólo se mantuvo significativo un menor porcentaje de ingresos en intensivos/intermedios en las mujeres entre 71 y 80 años y una menor cantidad de pruebas de esfuerzo en las mujeres entre 81-90 años. Al estratificar por TIMI, también desaparecieron gran parte de las diferencias y sólo se mantuvieron unos porcentajes inferiores de ingresos en intensivos/intermedios para las mujeres con TIMI ≤ 2 (15% vs 43%; $p < 0,01$) y de pruebas de esfuerzo en mujeres con TIMI entre 3 y 4 (23% vs 33%; $p = 0,04$).

Conclusiones: La aproximación diagnóstica del dolor torácico en el SUH puede parecer menos intensa en las mujeres, pero muchas de las diferencias inicialmente observadas desaparecen al estratificar por la edad y el TIMI. [*Emergencias* 2008;20:399-404]

Palabras clave: Dolor torácico. Género. Urgencias.