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Original article

Radial vs Femoral Access After Percutaneous Coronary Intervention for ST-segment Elevation Myocardial Infarction. Thirty-day and One-year Mortality Results

Alberto Ruano-Ravina,[a,b,*] Guillermo Aldama-López,[c] Belén Cid-Álvarez,[d] Pablo Piñón-Esteban,[c] Diego López-Otero,[d] Ramón Calviño-Santos,[c] Raymundo Ocaranza-Sánchez,[d] Nicolás Vázquez-González,[c] Ramiro Trillo-Nouche,[d] and Estrella López-Pardo[e]

[a] *Área de Medicina Preventiva y Salud Pública, Facultad de Medicina, Universidad de Santiago de Compostela, Santiago de Compostela, A Coruña, Spain*
[b] *CIBER de Epidemiología y Salud Pública, CIBERESP, Spain*
[c] *Unidad de Cardiología Intervencionista, Servicio de Cardiología, Complejo Hospitalario Universitario de A Coruña, A Coruña, Spain*
[d] *Unidad de Cardiología Intervencionista, Servicio de Cardiología, Complejo Hospitalario Universitario de Santiago de Compostela, Santiago de Compostela, A Coruña, Spain*
[e] *Subdirección de Calidad, Atención al Paciente y Admisión, Gerencia de Gestión Integrada de Santiago de Compostela, Servicio Gallego de Salud, Santiago de Compostela, A Coruña, Spain*

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ABSTRACT

Introduction and objectives: Little attention has been given to the effect of vascular access site on mortality, while an increasing body of evidence is showing that radial access has much more benefit than femoral access for ST-segment elevation myocardial infarction patients. We aimed to assess the influence of vascular access site on mortality at 30 days and at 1 year in ST-segment elevation myocardial infarction patients.

Methods: We included all patients with ST-segment elevation myocardial infarction who had undergone primary angioplasty at 2 Galician hospitals between 2008 and 2010. We performed 2 multivariate regression models for each endpoint (30-day and 1-year mortality). The only difference between these models was the inclusion or not of the vascular access site (femoral vs radial). For each of the 4 models we calculated the Hosmer-Lemeshow test and the C-index. We also tested the interaction between hemodynamic instability and vascular access.

Results: We included 1461 patients with a mean age of 64. Of these patients, 86% had radial access and 7.4% had hemodynamic instability. All-cause mortality was 6.8% (100/1461) at 30 days and 9.3% (136/1461) at 1 year. Vascular access site follows hemodynamic instability and age in terms of effect on mortality risk, with an odds ratio of 5.20 (95% confidence interval, 2.80-9.66) for 30-day mortality. A similar effect occurs for 1-year mortality. The C-index slightly improves (without achieving statistical significance) with the inclusion of the vascular access site.

Conclusions: Vascular access site should be taken into account when predicting mortality after a primary percutaneous coronary intervention.

Acceso radial frente a femoral después de una intervención coronaria percutánea en infarto agudo de miocardio con elevación del segmento ST. Resultados de mortalidad a 30 días y a 1 año

Palabras clave:
Infarto de miocardio
Intervención coronaria percutánea
Cohorte retrospectiva
Mortalidad

RESUMEN

Introducción y objetivos: Se ha prestado poca atención al efecto en la mortalidad que la vía de acceso vascular produce tras una intervención coronaria percutánea, aun cuando hay cada vez más evidencia de que la vía radial aporta un beneficio mucho mayor que el acceso femoral en los pacientes con infarto agudo de miocardio con elevación del segmento ST. El objetivo de este estudio es evaluar la influencia del lugar de acceso vascular en la mortalidad a 30 días y a 1 año en pacientes con infarto agudo de miocardio con elevación del segmento ST.

Métodos: Se incluyó en el estudio a todos los pacientes con infarto agudo de miocardio con elevación del segmento ST a los que se practicó una angioplastia primaria en dos hospitales de Galicia entre 2008 y 2010. Se aplicaron dos modelos de regresión multivariable para cada resultado de mortalidad (a 30 días y a 1 año). La única diferencia entre estos modelos fue la inclusión o exclusión del lugar de acceso vascular (femoral o radial). Para cada uno de los cuatro modelos, se calculó la prueba de

* Corresponding author: Área de Medicina Preventiva y Salud Pública, Facultad de Medicina, Universidad de Santiago de Compostela, San Francisco s/n, 15782 Santiago de Compostela, A Coruña, Spain.
E-mail address: alberto.ruano@usc.es (A. Ruano-Ravina).

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Hosmer-Lemeshow y el índice C. También se evaluó la interacción entre la inestabilidad hemodinámica y el acceso vascular para la mortalidad.
Resultados: Se incluyó a 1.461 pacientes con una media de edad de 64 años. En el 86% se utilizó un acceso vascular radial y en el 7,4% había inestabilidad hemodinámica. La mortalidad por cualquier causa fue del 6,8% (100/1.461) a los 30 días y del 9,3% (136/1.461) a 1 año. El lugar de acceso vascular sigue a la inestabilidad hemodinámica y a la edad en cuanto al efecto en el riesgo de mortalidad (mortalidad a 30 días, *odds ratio* = 5,20; intervalo de confianza del 95%, 2,80-9,66). Se produce un efecto similar en la mortalidad a 1 año. El índice C mejora ligeramente con la inclusión del lugar de acceso vascular, aunque sin alcanzar significación estadística.
Conclusiones: La vía de acceso vascular debería tenerse en cuenta en la predicción de la mortalidad tras una intervención coronaria percutánea primaria.

Abbreviations

OR: odds ratio
PCI: percutaneous coronary intervention
STEMI: ST-segment elevation myocardial infarction

INTRODUCTION

Myocardial infarction is one of the main causes of mortality and morbidity in developed countries. In recent years, mortality has decreased due to a better control of risk factors and an increased effectiveness of therapeutic treatments, mainly percutaneous coronary interventions (PCI).[1,2] Primary angioplasty is considered the best reperfusion strategy for patients with ST-segment elevation myocardial infarction (STEMI) and it should be offered within 90 min of contact with the health care system.[3]

The Galician Health Service, in northwest Spain, enacted a health program in 2005 aimed to improve the attention to myocardial infarction, named PROGALIAM.[4,5] This program represents a milestone in Europe and was probably one of the first to implement certain strategies that have improved the care of these patients: *a)* patients are transferred not to the nearest hospital but to the nearest hospital with PCI capabilities; *b)* the patient is delivered directly to a cath lab, bypassing the emergency care unit, which shortens the ischemia time,[5] and *c)* radial access is the first choice for PCI.

On the other hand, predicting the risk of death after PCI in patients with myocardial infarction has been a concern for surgeons. Many risk scores have been developed in recent years (TIMI, PAMI, CADILLAC, GRACE, NCDR, EuroHeart-PCI).[6–11] Although the included variables are not the same in all scores, most of them include the 2 variables most associated with mortality: hemodynamic instability, followed by age. Recent studies, one of them a meta-analysis, have shown that vascular access is a key variable in successful outcome after a PCI procedure, with radial access reducing mortality by approximately 50%.[12,13] Nevertheless, vascular access site has not been considered in the available mortality scores. Femoral artery access has been associated with much higher bleeding complications, and radial access with less kidney injury due to a lower use of contrast.[14–16] Despite this biological rationale favoring radial access, the RIVAL study did not find major differences between vascular access sites.[14] A result favoring radial access was recently reported by the RIFLE-STEACS study, showing lower morbidity and cardiac mortality. Interestingly, this study was performed in a clinical practice setting instead of being designed as a clinical trial.[17] Radial access shortens hospital stay and is probably more cost-effective than femoral access for PCI.

The aim of this paper is to assess the importance of vascular access site when predicting 30-day and 1-year all-cause mortality in patients with STEMI.

METHODS

Design and Setting

Patients were recruited at 2 Galician university hospitals, in A Coruña and Santiago de Compostela. The population covered by the A Coruña University Hospital Complex comprises approximately 1 100 000 inhabitants and that of Santiago de Compostela University Hospital Complex is close to 500 000 inhabitants. The study has a retrospective cohort design.

Inclusion and Exclusion Criteria

All patients presenting with STEMI between 2008 and 2010 who underwent primary angioplasty were included. The only exclusion criterion was to present a non ST-segment myocardial infarction. STEMI was defined according to the third universal definition of myocardial infarction, recently published by the European Society of Cardiology.[18]

Follow-up and Endpoints

The vital status of the included patients was assessed at regular intervals by clinicians of the 2 participating centers. When a patient dies, this information is updated in the electronic medical record approximately 2 months after the event. Surviving patients had a follow-up longer than 1 year and the main result was all-cause mortality at 30 days and at 1 year after a PCI for STEMI. This information was retrieved from the electronic medical records of the included patients.

Information Retrieval

The information collected for each patient can be classified as follows: *a)* demographic characteristics and pre-infarction variables: age, sex, body mass index, hypertension, diabetes, smoking status, dyslipidemia, peripheral artery disease, chronic kidney disease, previous PCI, previous acute myocardial infarction, congestive heart failure, and previous stroke; *b)* acute myocardial infarction presentation: type of contact with the health system, ischemia time, number of affected arteries, and hemodynamic instability; *c)* information regarding or obtained