



ORIGINAL ARTICLE

# Mortality benefit of long-term angiotensin-converting enzyme inhibitors or angiotensin receptor blockers after successful percutaneous coronary intervention in non-ST elevation acute myocardial infarction



María Cristina González-Cambeiro<sup>a,\*</sup>,<sup>1</sup>, Andrea López-López<sup>b,1</sup>, Emad Abu-Assi<sup>b</sup>, Sergio Raposeiras-Roubín<sup>b</sup>, Carlos Peña-Gil<sup>b</sup>, José García-Acuña<sup>b</sup>, Ramón González-Juanatey<sup>b</sup>

<sup>a</sup> Department of Cardiology and Coronary Care Unit, Complejo Hospitalario de Pontevedra, Pontevedra, Spain

<sup>b</sup> Department of Cardiology and Coronary Care Unit, Hospital Clínico Universitario de Santiago de Compostela, Santiago de Compostela, A Coruña, Spain

Received 17 January 2016; accepted 28 July 2016

## KEYWORDS

Angiotensin-converting enzyme inhibitors;  
Angiotensin receptor blockers;  
Mortality;  
Non-ST elevation myocardial infarction

## Abstract

**Introduction and objectives:** Angiotensin-converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs) have been shown to reduce mortality after myocardial infarction (MI). Current guidelines recommend their prescription in all patients after MI. Limited data are available on whether ACEIs/ARBs still improve prognosis in the contemporary era of non-ST elevation MI (NSTEMI) management. We aimed to evaluate the mortality benefit of ACEIs/ARBs in NSTEMI patients treated successfully with percutaneous coronary intervention (PCI).

**Methods:** We analyzed 2784 patients with NSTEMI treated successfully with in-hospital PCI. Two groups were formed based on ACEI/ARB prescription at discharge. Two propensity score (PS) analyses were performed to control for differences in covariates: one with adjustment among the entire cohort, and the other with PS matching (n=1626). The outcome variable was all-cause mortality at four-year follow-up.

**Results:** There were 1902 (68.3%) patients prescribed ACEIs/ARBs at discharge. When adjusted by PS, ACEI/ARB use was associated with a hazard ratio (HR) for mortality of 0.75 (0.60-0.94; absolute risk reduction [ARR] 4.0%) in the whole cohort (p=0.01).

After one-to-one PS matching (n=813 in each group), the mortality rate was significantly lower in patients prescribed ACEIs/ARBs, with HR of 0.77 (0.63-0.94; ARR 3.8%) (p=0.03).

\* Corresponding author.

E-mail address: [cambe\\_cris@hotmail.com](mailto:cambe_cris@hotmail.com) (M.C. González-Cambeiro).

<sup>1</sup> Both authors contributed equally.

**PALAVRAS-CHAVE**

Inibidores da enzima de conversão da angiotensina; Antagonistas do recetor da angiotensina; Mortalidade; Enfarte do miocárdio sem elevação do segmento ST

**Conclusions:** In this observational study of patients with NSTEMI, all of them treated successfully by PCI, the use of ACEIs/ARBs was significantly associated with a lower risk of four-year all-cause mortality.

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### Benefício a longo prazo do tratamento com inibidores da enzima de conversão da angiotensina ou antagonistas do recetor da angiotensina, após intervenção coronária percutânea bem-sucedida, no enfarte agudo do miocárdio sem elevação do segmento ST

**Resumo**

**Introdução e objetivos:** Os inibidores da enzima de conversão da angiotensina (IECA) ou os antagonistas do recetor da angiotensina (ARA) mostraram reduzir a mortalidade após enfarte do miocárdio (EM). As guias internacionais atuais recomendam a sua prescrição a todos os doentes após EM. Existem poucos dados disponíveis relativamente a se os IECA/ARA continuam a melhorar o prognóstico na abordagem atual do EM sem elevação do segmento ST (EMSEST). O nosso objetivo foi avaliar o benefício em termos de mortalidade dos IECA ou ARA em doentes com EMSEST, tratados com intervenção coronária percutânea (ICP) com sucesso.

**Métodos:** Analisámos 2784 doentes com EMSEST tratados, de forma bem-sucedida, com ICP durante o internamento hospitalar. Foram constituídos dois grupos com base na prescrição de IECA/ARA aquando da alta. Foram efetuadas duas análises de *propensity score* para controlar diferenças nas co variáveis: uma com ajuste entre toda a coorte e outra com *propensity score matching* (n=1,626). A variável resultado foi a mortalidade por qualquer causa, após quatro anos de seguimento.

**Resultados:** Houve 1902 (68,3%) de doentes com IECA/ARA prescritos aquando da alta. Quando ajustado para o *propensity score*, o uso de IECA/ARA associou-se a um *hazard ratio* de 0,75 para mortalidade (0,60-0,94; redução do risco absoluto [RRA] 4,0%) em toda a coorte (p=0,01).

Após o *one-to-one propensity score matching* (n=813 em cada grupo), a taxa de mortalidade foi significativamente menor em doentes sob tratamento com IECA/ARA, com um *hazard ratio* de 0,77 (0,63-0,94; RRA 3,8%) (p=0,03).

**Conclusões:** Neste estudo observacional de doentes com EMSEST, todos tratados com ICP com sucesso, o uso de IECA/ARA esteve associado a um risco significativamente menor de mortalidade por todas as causas aos quatro anos.

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**List of abbreviations**

ACEI	angiotensin-converting enzyme inhibitor
ACS	acute coronary syndrome
ARB	angiotensin receptor blocker
ARR	absolute risk reduction
CABG	coronary artery bypass grafting
CAD	coronary artery disease
ECG	electrocardiogram
HR	hazard ratio
LVEF	left ventricular ejection fraction
MI	myocardial infarction
NSTEMI	non-ST elevation myocardial infarction
PCI	percutaneous coronary intervention
PS	propensity score
STEMI	ST-elevation myocardial infarction
TIMI	Thrombolysis In Myocardial Infarction

**Introduction**

Many randomized trials have demonstrated that inhibition of the renin-angiotensin system with angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers (ARBs) significantly improves short- and long-term prognosis after an acute myocardial infarction (MI).<sup>1-16</sup> In these trials, the vast majority of patients had ST-elevation MI (STEMI), and the data on non-ST elevation MI (NSTEMI) patients are limited.

Contemporary management of patients with NSTEMI based on the results of large-scale randomized controlled trials demonstrates survival benefits with early invasive strategies<sup>17</sup> and secondary prevention treatments including antiplatelets,<sup>18</sup> beta-blockers<sup>19</sup> and statins<sup>20</sup> started soon after the index event. However, no studies have examined the independent impact of ACEIs/ARBs on clinical outcomes in NSTEMI. Despite this, the European<sup>21</sup> and North American<sup>22</sup> guidelines recommend long-term use of

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