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Factors that impact in-hospital mortality due to STEMI versus NSTEMI in a first percutaneous coronary intervention: survival analysis

Factores que impactan en la mortalidad intrahospitalaria por STEMI vs NSTEMI en la primera intervención coronaria percutánea: análisis de supervivencia

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Abstract

Objective: *Acute coronary syndrome is a potentially fatal disease if it is not intervened in a timely and appropriate manner. In Colombia in 2021, 51,988 deaths were recorded from this cause. The aim is to compare the clinical characteristics of ST-elevation myocardial infarction (STEMI) and non-ST elevation acute myocardial infarction (NSTEMI) and percutaneous coronary intervention (PCI), determining in-hospital (< 30 days) survival with factors associated with mortality.* **Methods:** *Prospective cohort study (2020-2021), with survival analysis using the Kaplan–Meier method and Cox regression model to determine predictive factors that impacted in-hospital mortality in a high-complexity institution, Medellín, Colombia.* **Results:** *Of 504 participants, 53% had STEMI, and 47% had NSTEMI. Median age 64 years (interquartile range 57-73), 66% were men. In-hospital survival in NSTEMI was 98.3% (95% confidence interval [CI]: 97-100), and STEMI was 93.7% (95% CI: 91-97). Significant predictors that impacted in-hospital mortality for STEMI were: Age > 65 years (hazard ratio [HR]: 3.47 p: 042), Diabetes (HR: 5.07 p: 0.002), Killip IV (HR: 21.6 p < 0.001) and post-PCI Arrhythmia (HR: 6 p: 0.002). In contrast, predictors for NSTEMI were Cardiogenic Shock (HR: 23.3 p: 0.047) and post-PCI arrhythmia (HR: 23.4 p: 0.047).* **Conclusion:** *Patients with Killip IV NSTEMI and post-PCI arrhythmia constitute a group at higher cardiovascular risk with a higher in-hospital mortality than STEMI patients. Furthermore, diabetes is a modifiable risk factor that could impact early survival in STEMI patients after PCI.*

Keywords: *Myocardial infarction. ST elevation myocardial infarction. Non-ST-elevated myocardial infarction. Angioplasty balloon coronary. Percutaneous coronary intervention. Survival analysis.*

Resumen

Objetivo: *El síndrome coronario agudo es una enfermedad potencialmente fatal si no se interviene de manera oportuna y adecuada. En Colombia, en 2021, se registraron 51,988 muertes por esta causa. El objetivo fue comparar las características*

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clínicas del infarto agudo de miocardio con elevación del segmento ST (IAMCEST) y sin elevación del segmento ST (IAMSEST), así como la intervención coronaria percutánea (ICP), determinando la supervivencia intrahospitalaria (< 30 días) y los factores asociados con la mortalidad. **Métodos:** *Estudio de cohorte prospectivo (2020-2021), con análisis de supervivencia utilizando el método de Kaplan-Meier y el modelo de regresión de Cox para determinar los factores predictivos que impactaron en la mortalidad intrahospitalaria en una institución de alta complejidad, Medellín, Colombia.* **Resultados:** *De 504 participantes, el 53% presentó IAMCEST y el 47% IAMSEST. La mediana de edad fue de 64 años (RIC 57-73), y el 66% fueron hombres. La supervivencia intrahospitalaria en IAMSEST fue del 98.3% (IC 95%: 97-100), y en IAMCEST del 93.7% (IC 95%: 91-97). Los predictores significativos que impactaron en la mortalidad intrahospitalaria para IAMCEST fueron: edad > 65 años (hazard ratio - HR: 3,47; p: 0.042), diabetes (HR: 5.07; p: 0.002), Killip IV (HR: 21.6; p < 0.001) y arritmia post-ICP (HR: 6; p: 0.002). En contraste, los predictores para IAMSEST fueron el choque cardiogénico (HR: 23.3; p: 0.047) y la arritmia post-ICP (HR: 23.4; p: 0.047).* **Conclusiones:** *Los pacientes con IAMSEST Killip IV y arritmia post-ICP constituyen un grupo de mayor riesgo cardiovascular con una mortalidad intrahospitalaria superior a la de los pacientes con IAMCEST. Además, la diabetes es un factor de riesgo modificable que podría impactar la supervivencia temprana en pacientes con IAMCEST posterior a una ICP.*

Palabras clave: *Infarto de miocardio. Infarto agudo de miocardio con elevación del segmento ST. Infarto agudo de miocardio sin elevación del segmento ST. Angioplastia coronaria con balón. Intervención coronaria percutánea. Análisis de supervivencia.*

Introduction

Acute coronary syndrome (ACS) is defined as a life-threatening condition that affects both men and women, especially those over 45 years of age. It is responsible for 16% of all deaths worldwide[1,2]. Since 2000, there has been an increase of more than 2 million deaths to 8.9 million in 2019[3,4]. In developed countries, coronary heart disease is one of the leading causes of mortality and disability[4]. In Colombia in 2013, the mortality rate from ACS was 107.3/100,000 inhabitants between 45 and 64 years of age and 867.1 deaths/100,000 people over 65 years of age[5,6]. In 2022, the mortality rate from ACS was 96.57/100,000 inhabitants in the general population, while in the ages of 30-70 years, it was like that of 10 years ago (100.5/100,000 people)[7]. In Medellín, the mortality rate was lower than in the national population[8].

Acute myocardial infarction (AMI) is caused by a decrease in coronary blood flow associated with some obstruction. It is diagnosed by clinical criteria, specific signs and symptoms of precordial pain accompanied by the analysis of an electrocardiogram (ECG) and levels of high-sensitivity troponin I or T[9-11,12], the latter may be negative as in non-ST elevation AMI (NSTEMI).

The standard management is percutaneous coronary intervention (PCI), which involves performing angioplasty and placing intracoronary devices (Stents). PCI is an effective procedure to restore perfusion in ST-elevation myocardial infarction (STEMI) if performed within the first 2 h of the onset of AMI[11]. Unlike in patients with NSTEMI, PCI can be offered after 24 h of the ischemic event, except in high-risk patients, such as electrical instability and cardiogenic shock (CS), where intervention should be within the first 2 h, according to American and European cardiology guidelines[12,13].

This study compares the clinical characteristics and in-hospital survival of patients with STEMI and NSTEMI who underwent their initial PCI while identifying in-hospital mortality predictive factors (< 30 days of PCI).

Methodology

The data presented correspond to the registry of PCI interventional activity in STEMI and NSTEMI in a highly complex institution in Medellín, Colombia. The baseline characteristics and cardiac events of all patients who underwent PCI with a diagnosis of STEMI and NSTEMI at the institution were prospectively recorded from January 2020 to December 2021, both inclusive. This hospital Centre is a reference, located in the geographical centre of the region, has a high interventional volume, a cardiologist on call, and a hemodynamic team on permanent call.

Patients

Patients with STEMI were included in the registry, defined as symptoms compatible with myocardial ischemia lasting more than 30 min or that persist after the administration of nitrites and persistent elevation of the ST segment on the ECG > 1 mm in 2 consecutive leads or non-diagnostic ECG (complete left bundle branch

block or pacemaker rhythm)[5,12,13]. Moreover, NSTEMI patients with ischemic symptoms with positivity in troponins I (Reagent Kit/hsTnI STAT; standard value Men: 17 ng/mL, Women: 13 ng/mL) without ECG alteration.

The window for the indication of PCI was shown to be the 12 h following the onset of symptoms unless symptoms or signs of myocardial ischemia persist. Patients with previous angioplasties, MINOCA, and those who received thrombolytic treatment for the current infarction 24 h before the procedure were excluded. Patients who attended the reference interventional center were systematically treated with PCI. After discharge, the patients were transferred to their centre of origin in a primary surveillance unit. In addition, clinical follow-ups were carried out by reviewing medical reports from the reference center for 1 month.

Mechanical reperfusion of the artery causing the infarction was attempted in all included patients. Other arteries were treated when deemed appropriate by the responsible interventional cardiologist or in the context of CS. The access route, the material used, the medication administered, and the added procedures (orotracheal intubation, counter pulsation balloon, and temporary pacemaker) were carried out according to the criteria of the responsible hemodynamicist. CS was defined in the ward as the presence of a sustained systolic blood pressure < 90 mmHg or the need for pharmacological or mechanical support to maintain blood pressure and cardiac output. The final angiographic success of the intervention was defined as obtaining a final TIMI III flow with visual residual stenosis < 20% without significant complications[12,14,15]. This study has the approval of the institution's ethics committee.

Statistics

Continuous variables are presented as mean ± standard deviation and were compared using the Student *t*-test for independent groups. Categorical variables were compared using Fisher's exact test. Statistical significance was defined by a two-sided $p < 0.05$ or confidence intervals (CI) that did not include 1.0. Kaplan–Meier models were used to measure the effect of sex, type of infarction, and in-hospital mortality (< 30 days of PCI), using the initial maximum model that contained the variables age > 65 years, sex, intervention > 12 h, smoking, diabetes, CS, number of involved vessels, previous structural heart disease, hypertension, COVID-19, reinfarction, post-PCI arrhythmia, Ejection fraction < 40% and the interaction of these variables with the type of infarction.

Dummy variables were used to analyze the variable number of vessels involved, and the reference category was multivessel disease (> 2 vessels). A stepwise sequential exclusion method was used to select variables predicting early mortality, starting with sociodemographic and clinical variables, then procedural variables, excluding those with no significant association with mortality. Model calibrations were performed according to the Hosmer and Lemeshow goodness-of-fit test. A multivariate analysis of short-term events was performed using the Cox proportional hazards method, including the abovementioned variables, with statistical significance. The analyses were carried out using the Jamovi Project 2022 statistical package, version 2.3.

Results

During the 2 years of the 2020-2021 inclusion period, 964 urgent PCIs were indicated in the context of AMI. Of them, 173 (18%) had previous coronary procedures, 95 (10%) were AMI patients with coronary arteries without significant lesions (MINOCA), in another 77 (8%) the procedure was not performed for different reasons (inaccurate diagnosis, atrial fibrillation, valvular disease, stable angina or other medical conditions that were stabilized with initial medical management), and in 115 (12%) had received thrombolytic treatment in the previous 24 h, so they were excluded. Finally, 504 patients were included in the analysis, of which 269 (53%) were STEMI and 235 (47%) were NSTEMI.

Upon admission of the patient with AMI to the emergency department, the electrocardiographic tracing was taken and interpreted, always interpreted jointly with the hemodynamic cardiologist. The routine protocol, STEMI, immediate activation of the hemodynamic intervention group; they were given antiplatelet load Clopidogrel 600 mg and Aspirin 300 mg, all orally. If the patient presented high blood pressure figures or stable pressures, Nitroglycerin was placed IV, titrating according to the behavior of the blood pressure figures. Then, he was transferred to the hemodynamics room, the puncture was carried out, in most cases via right radial access, diagnostic coronary angiography was performed, and placement of Sodium Heparin IV (100 mg/kg). The coronary guide was introduced, angioplasty balloon, vessel opening, and placement of medicated stent. Post-procedure follow-up was then performed in the special care unit, always with dual antiplatelet therapy (aspirin 100 mg and clopidogrel

Table 1. Baseline clinical characteristics of the patient

Sociodemographic and clinical variables	All n: 504 n (%)	STEMI n: 269 n (%)	Deaths STEMI[16]	NSTEMI n: 235 n (%)	Deaths NSTEMI[4]	p < 0.05[α]
Me (IQR): Age (years)	64 (57-73)	64 (58-75)	73 (66-78)	64 (56-72)	83 (77-88)	0.191
Male	332 (66)	181 (67)	12 (70.6)	151 (64)	0 (0)	0.010
Urban residence	470 (93)	248 (92)	15 (88.2)	222 (94)	4 (100)	0.471
Referred	353 (70)	179 (67)	11 (64.7)	174 (74)	1 (25)	0.149
Pathological History			8 (47)			
HBP	267 (53)	130 (48)	8 (47)	137 (58)	4 (100)	0.054
Diabetes	125 (25)	51 (19)	4 (23.5)	74 (31)	2 (50)	0.916
Dyslipidemia	64 (26)	64 (24)	0 (0)	68 (29)	1 (25)	0.950
Obesity (BMI > 30)	93 (18)	31 (11)	3 (17.6)	62 (26)	1 (25)	0.035
PSHD*	93 (19)	44 (16)	1 (5.9)	49 (21)	1 (25)	0.736
Previous arrhythmias	28 (6)	14 (5)	0 (0)	14 (6)	1 (25)	0.241
COPD	37 (7.3)	17 (6)	0 (0)	20 (9)	1 (25)	0.035
Cancer	21 (4.2)	11 (4)	1 (5.9)	10 (4)	1 (25)	0.035
COVID-19	9 (1.8)	5 (2)		4 (2)	1 (25)	0.241
Toxicological history						
Smoking	330 (66)	177 (66)	11 (64.7)	153 (65)	3 (75)	0.694
Active smoker	147 (29)	85 (32)	2 (11.8)	62 (26)	0 (0)	0.471
Alcoholism	104 (21)	61 (23)	1 (5.9)	43 (18)	0 (0)	0.619
Active liquor intake	97 (18)	58 (22)	1 (5.9)	39 (17)	0 (0)	0.619
Initial type of angina						
Unstable	335 (66)	196 (73)	11 (64.7)	139 (59)	3 (75)	0.694
Typical	404 (80)	208 (77)	11 (64.7)	196 (83)	3 (75)	0.857
Killip						
I	446 (89)	231 (86)	8 (47)	215 (91)	0 (0)	0.061
II	21 (4)	10 (4)	1 (5.9)	11 (5)	1 (25)	
III	13 (2.2)	7 (3)	0 (0)	6 (3)	1 (25)	
IV	24 (4.8)	21 (8)	8 (47)	3 (1)	2 (50)	

Me (IQR): median and interquartile range.
p < 0.05[a] significant difference between deaths by type of heart attack.
*Patients with a history of ischemic, hypertrophic heart disease, or valvular heart disease. Tachyarrhythmias, bradyarrhythmia, atrioventricular blocks.
PSHD: previous structural heart disease; COPD: chronic obstructive pulmonary disease; HBP: high blood pressure; STEMI: ST elevation myocardial infarction; NSTEMI: non-ST elevation myocardial infarction; BMI: body mass index.

75 mg), use of high-impact statins (rosuvastatin 40 mg or atorvastatin 80 mg). Finally, they underwent cardiac rehabilitation and were taught healthy lifestyle habits.

In the case of NSTEMI, the hemodynamic intervention protocol is deferred to be performed within 24 or 48 h. This protocol is broken if there is hemodynamic instability or severe pain, which requires early intervention. The pharmacological protocol and post-procedure protocol are the same as for STEMI.

The baseline characteristics of the patients according to the type of AMI are presented in table 1. For both types of AMI, the mean age was 64 years, with a prevalence of 64% higher in men than in women; 93% came from urban areas, and 98% belonged to the contributory regime. In STEMI, they experienced a trend of being more active smokers, liquor intake, a more significant initial clinical presentation of unstable angina, and Killip IV. For the NSTEMI, they were more hypertensive, diabetic, dyslipidemia, and obese, with a more remarkable presentation of stable and typical angina.

The characteristics of the procedure are shown in table 2. The procedural characteristics are shown in table 2, where door-to-balloon time was close to the recommendations of clinical guidelines for STEMI, while the intervention time (PCI) for NSTEMI was longer. Additionally, more cardiopulmonary resuscitation (CPR) was required for the STEMI group due to a higher number of patients with CS, post-PCI arrhythmia, reinfarction, and a more significant < 40% reduction in left ventricular ejection fraction (VLEF).

Early or in-hospital mortality (< 30 days) was a total of 21 deaths, with a higher prevalence in those > 65 years of age and STEMI 6.3 versus 1.7%; NSTEMI (p = 0.001) (Fig. 1). Furthermore, no significant differences were observed by sex. The univariate Cox

Table 2. Characteristics of the procedure by type of AMI

Variables	All n: 504 n (%)	STEMI n: 269 n (%)	Deaths STEMI[16]	NSTEMI n: 235 n (%)	Deaths NSTEMI[4]	p < 0.05‡
Balloon door*	90	154″ (104″-187″)	169″ (117″-261″)			
PCI intervention*	504	228″ (133″-739″)	219″ (133″-645″)	787″ (334″-1151″)	343″ (272″-1047″)	0.077
Entry route						0.765
Radial (R)	414 (82)	212 (79)	8 (47)	202 (86)	2 (50)	
Femoral (F)	75 (15)	46 (17)	7 (41.2)	29 (12)	2 (50)	
Mixed (R + F)	15 (3)	11 (4)	2 (11.8)	4 (2)	0 (0)	
Compromised vessels						
N° vessels†	1.4 (0.9)	1.38 (0.8)	1.7 (0.8)	1.45 (1.02)	1.9 (1.05)	0.793
One vessel	244 (49)	134 (50)	10 (58.8)	110 (47)	2 (50)	
> Two vessels	260 (51)	135 (50)	7 (41.2)	125 (53)	2 (50)	
Required CPR						0.280
Before PCI	12 (2.4)	11 (4)	1 (5.9)	1 (0.4)	1 (25)	
During PCI	1 (0.2)	0 (0)	0 (0)	1 (0.4)	1 (25)	
After PCI	9 (1.8)	7 (3)	5 (29.4)	2 (0.8)	2 (50)	
Mortality						
PCI month	21 (4.1)	17 (6.3)	17 (100)	4 (1.7)	4 (100)	
Additional factors						
Age > 65 years	244 (49)	129 (48)	13 (76.5)	115 (49)	4 (100)	0.281
Post-PCI arrhythmias	32 (6.3)	26 (10)	5 (29.4)	6 (3)	3 (75)	0.091
CS	55 (11)	41 (15)	6 (35.6)	14 (6)	3 (75)	0.149
Re-infarction < 30 days	6 (1.2)	5 (2)	4 (23.5)	1 (0)	0 (0)	0.281
VLEF ≤ 40%	100 (20)	75 (28)	10 (58.8)	25 (11)	1 (25)	0.223
PCI > 12 H	305 (61)	111 (41)	4 (23.5)	194 (83)	2 (50)	0.549

″Minutes.
*M: median.
†Number of vessels with significant obstructions > 70% mean (standard deviation).
‡p < 0.05 significant difference between deaths by type of heart attack.
IQR: interquartile range; CS: cardiogenic shock; VLEF: ventricular left ejection fraction; Balloon door: is the time in minutes between the patient's arrival at the emergency room until the start of percutaneous coronary intervention, evaluated in patients with STEMI, without previous fibrinolytic intervention or asymptomatic patients or patients with suspicion of COVID-19 because they were given a wait different from the management protocol.

analysis for early mortality according to AMI is shown in table 3. The main predictors in STEMI were diabetes, Killip IV clinical presentation, CPR for managing CS, reinfarction, post-PCI arrhythmia and a VLEF < 40%. Meanwhile, in the NSTEMI, they were post-infarction arrhythmia, CPR, Covid-19 and CS. The significant variables that adjusted the model were included in the multivariable analysis, eliminating the confounding variables (Fig. 2).

Discussion

PCI has significantly impacted mortality in patients with STEMI, even with CS. It is now the standard of care in most institutions like ours. The Japanese Association of cardiovascular therapeutics and intervention proposes updated guidelines for treating AMI, published by the European Society of Cardiology in 2017, 2020, and 2022[11-14]. Significant guideline changes for patients with STEMI included radial access and drug-eluting stents, which were recommended instead of drug-free stents (Class I Indication), and complete revascularisation before hospital discharge (either immediate or staged) (Class IIa recommendation). An early invasive strategy within 24 h is recommended for patients with NSTEMI (Class I indication) and complete revascularisation in patients without CS (Class IIa recommendation)[15]. Despite achieving this strategy in STEMI and NSTEMI deaths, we observe other factors that are associated with mortality.

In a population-based study conducted in New York by Barnhart et al.[16], with AMI and PCI in 1996, they found that the probability of dying in the first 30 days was 24.5% for Hispanics compared to 32% for non-Hispanics, while the overall mortality in our study was 4.1% (Clarifying that the main inclusion criterion was patients with first PCI). In another population-based registry carried out in Japan by Sawayama et al. in 2015[17],

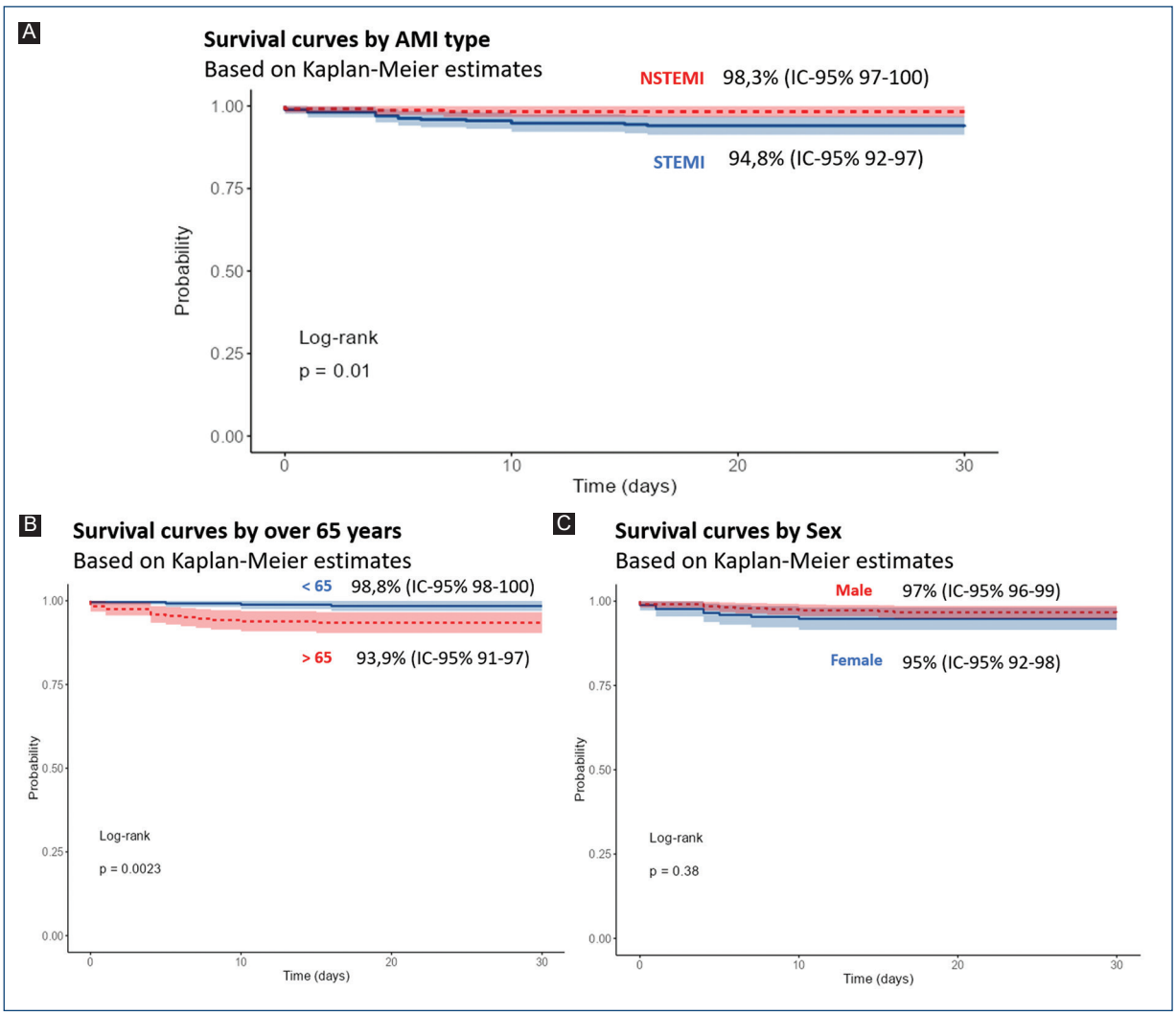

Figure 1. Hospital survival curves and cumulative hazard ratio for type of acute myocardial infarction, sex and age. Survival estimates by Kaplan-Meier. **A:** STEMI has a higher risk of dying than NSTEMI with a statistically significant difference; STEMI: ST elevation acute myocardial infarction; NSTEMI: non-ST elevation myocardial infarction. **B:** patients > 65 years were significantly associated with a higher risk of dying in the 1st month than those younger. **C:** according to sex, no statistically significant difference was found for in-hospital mortality.

age-adjusted in-hospital mortality in patients with AMI and PCI was 12.3% for STEMI and 5.8% for NSTEMI, percentages higher than those found in our study, which were 6.3% and 1.7%, respectively. Meanwhile, in another systematic review from 2022, early mortality in Latin America and the Caribbean was 9.9% for STEMI and 6.3% for NSTEMI[18]. A local study by Echeverri et al. found that in-hospital mortality was 6% for AMI and PCI in a population over 75 years of age[19].

CS continues to be the fatal complication in patients who present an acute coronary event, with an incidence that ranges between 5 and 12%[20-22], being very similar to the behavior of our population, 11% (55/504), in particular patients with STEMI. Although advances in treatment have significantly reduced overall mortality, mainly in early revascularisation with PCI, patients with AMI and CS were associated with high mortality (≅ 50%). Our study showed 40%, a level slightly lower than that found in the literature[20-23].

On the other hand, in our study, STEMI patients who presented a VELF reduction < 40% (HR: 4.6; 95% CI 1.6-12.7; p = 0.003) and post-PCI arrhythmia (HR: 4.2; 95% CI 1.5-11.9; p = 0.007) increased the risk of dying 8.8 times, in the first 30 days after PCI. These findings were found in the study by Wang et al.[22] where VELF reductions < 50% acted as a risk factor for

Table 3. Factors associated with mortality at month after PCI in Cox regression analysis

Associated factors	STEMI (n = 269)		NSTEMI (n = 235)	
	HR (IC 95%)	p	HR (IC 95%)	p
Age > 65 years	3.67 (1.2-11.2)	0.023	1.2 (0.9-1.6)	0.120
HBP	0.95 (0.3-2.4)	0.907	0.97 (0.7-1.3)	0.808
DB	4.1 (1.6-10.5)	0.004	2.2 (0.3-15.5)	0.435
Obesity	0.0 (0.0-0.0)	0.998	0.9 (0.1-8.9)	0.953
PSHD	1.1 (0.3-3.7)	0.919	1.3 (0.1-12)	0.840
Stable angina	1.5 (0.5-3.9)	0.443	0.5 (0.01-4.6)	0.524
Killip IV	14.3 (5.3-38.1)	0.001	2.9 (0.4-21)	0.290
PCI > 12H	1.15 (0.44-3)	0.782	0.2 (0.03-1.4)	0.100
Post-PCI arrhythmia	4.2 (1.5-11.9)	0.007	147 (15-1427)	< 0.001
VLEF ≤ 40%	4.6 (1.6-12.7)	0.003	8.3 (0.5-132)	0.135
Cardiogenic shock	7.5 (2.8-20)	< 0.001	147 (15-1427)	< 0.001
Re heart attack	46.3 (14-147)	< 0.001	2.9 (0.4-21)	0.287
COVID-19	3.6 (0.5-27)	0.210	1.3 (0.7-2.3)	0.001
Required CPR	14.7 (5.5-39)	< 0.001	3 (0.9-9.3)	0.001
Multi-vessels	0.8 (0.2-3.5)	0.736	0.8 (0.1-6.3)	0.899

Patients with a history of ischemic, hypertrophic heart disease, or valvular heart disease. Tachyarrhythmias, bradyarrhythmia, atrioventricular blocks.
HBP: high blood pressure; DB: diabetes; PCI: percutaneous coronary intervention; PSHD: previous structural heart disease; STEMI: ST elevation myocardial infarction; NSTEMI: non-ST elevation myocardial infarction; PSHD: previous structural heart disease; VLEF: ventricular left ejection fraction; Multi-vessels: > Two vessels. CPR: cardio pulmonary resuscitation.

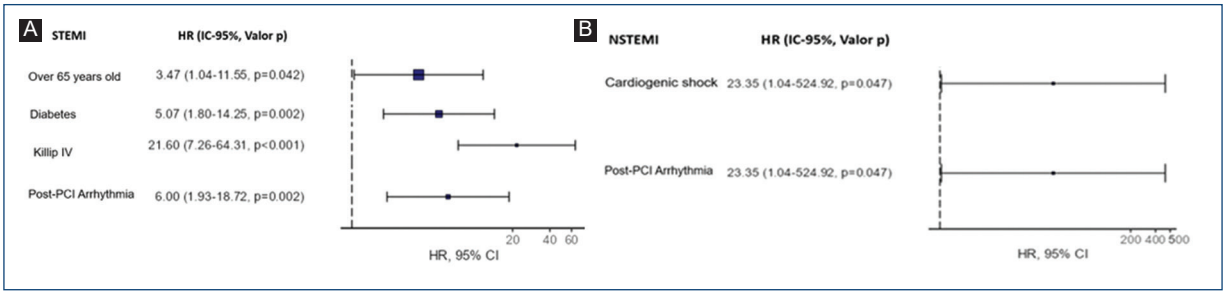

Figure 2. Factors associated with in-hospital mortality (< 30 days after percutaneous coronary intervention) in the multivariate Cox model. **A:** model metrics STEMI: number in model = 235, number of events = 17, concordance = 0.877 (standard error [SE] = 0.040), R-squared = 0.167 (max possible = 0.522), likelihood ratio test = 43.072 (df = 4, p = 0.000). **B:** model metrics NSTEMI: number in model = 235, number of events = 4, concordance = 0.870 (SE = 0.110), R-squared = 0.099 (max possible = 0.169), likelihood ratio test = 24.404 (df = 2, p = 0.000). STEMI: ST elevation acute myocardial infarction; NSTEMI: non-ST elevation myocardial infarction.

long-term overall mortality in STEMI patients after PCI, particularly.

In the Cox multivariate, other predictive factors that were significantly associated with early and late mortality in patients with STEMI were diabetes (HR: 5; p = 0.002), age over 65 years (HR: 3.5; p = 0.042), a severe clinical presentation in the emergency services (Killip IV) (HR: 22.6; p = 0.002) and post-ICP arrhythmia (HR: 6; p = 0.002). These predictors were found with the systematic review by Yan et al.[24], where they concluded that advanced age (odds ratio [OR] = 3.89), CS (OR = 4.83), diabetes mellitus (OR = 2.01), and

delay in door-to-balloon time (OR = 1.72), were risk factors significantly associated with mortality in patients with STEMI after PCI. Similar results in the meta-analysis by Lou et al.[25], where diabetes presented a higher risk of in-hospital mortality in AMI and PCI, OR: 1.34 (95% CI, 1.17-1.54) and cerebrovascular complications, OR: 1.28 (95% CI, 1.11-1.48), than those without diabetes.

Furthermore, in the systematic review by Gabani et al.[26,27], no statistically significant difference was found by sex and early or late mortality after the "Examination" clinical trial with a 10-year follow-up with 1,498 patients with STEMI and PCI. Similar results were found in our study (Fig. 1).

Therefore, statistically significant associated factors for in-hospital mortality in STEMI, such as age > 65 years HR: 3.67; diabetes HR: 4.1; Killip IV HR: 14.3; Post-PCI arrhythmia HR: 4.2; VLEF < 40% HR: 4.6; SC HR: 7.5; reinfarction HR: 46.3; CPR required HR: 14.7 and for NSTEMI Post-PCI arrhythmia HR: 147; SC HR: 147; CPR required HR: 3 and COVID-19 HR: 1.3, were evidenced in our univariate Cox regression analysis (Table 3) and reported in the literature[20-28].

Finally, being diabetic over 65 years of age, arriving at the emergency room with a Killip IV and presenting a post-PCI arrhythmia increased the risk of dying in the hospital by 36 times for STEMI, while for NSTEMI, it increased the risk by 46 times if the patient had CS and post-PCI arrhythmia. Despite a significant difference found between mortality groups, mainly in the variables of obesity, chronic obstructive pulmonary disease and cancer, this was too small to be important in NSTEM.

Conclusion

Patients with Killip IV NSTEMI and post-PCI arrhythmia constitute a group at higher cardiovascular risk with a higher in-hospital mortality than STEMI patients[27]. Furthermore, diabetes is a modifiable risk factor that could impact early survival in STEMI patients after PCI. Therefore, the primary care medical team is motivated to achieve rigorous glycemic control in the American Diabetes Association – goals (hemoglobin A1c < 7) which could impact early survival in diabetic patients with STEMI, and the hemodynamics team to optimize strategies in patients with Killip IV AMI and post-PCI arrhythmia, reducing hospital mortality in patients with a first episode of myocardial infarction and PCI.

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Conflicts of interest

The authors declare no conflicts of interest.

Ethical considerations

Protection of human subjects and animals. The authors declare that no experiments on humans or animals were performed for this research.

Confidentiality, informed consent, and ethical approval. The authors have obtained approval from the Ethics Committee for the analysis of routinely collected and anonymized clinical data; therefore, individual informed consent was not required. Relevant ethical recommendations have been followed.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing or creation of the content of this manuscript.

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