Table 2
Preoperative Characteristics and Results Obtained in Patients Treated Using Miniaccess Techniques

	Ao group	MT group
Patients, n	963	282
Age, y	75 [67-80]	60 [49-69]
HT	75	29
Diabetes mellitus	27	9
Dyslipidemia	62	19
COPD	15	7
Peripheral arterial disease	8	0.4
Renal failure	8	3
Previous stroke	5	4
Normal ejection fraction	87	89
Moderately reduced ejection fraction	12	8.2
Severely reduced ejection fraction	1.5	1.1
Logistic EuroSCORE	5 [3-7]	2.7 [1.5-6.8]
EuroSCORE II	2 [1-3]	1.7 [0.8-2.3]
Size of incision, cm	8 [7-9]	7 [6-8.5]
Duration extracorporeal circulation, min	81 ± 31	123 ± 45
Duration aortic clamping, min	61 ± 23	81 ± 42
ICU stay, days	3 ± 5	3 ± 6
Total hospital stay, d	10 ± 10	10 ± 8
Reoperation for bleeding	2.80	3.90
Number packed red blood cell units transfused	1 ± 1.8	0.7 ± 1.4
Postoperative low cardiac output	4	3.9
Perioperative AMI	0.2	1.4
Pulmonary complications	6	5
Postoperative atrial fibrillation	24	9.6
Pacemaker requirement	4.7	2.5
Neurological complications	3.2	2.5
Postoperative renal failure	8.2	3.9
Surgical wound infection	1.8	1.8
Absence of periprosthetic aortic regurgitation	96	
Mild periprosthetic aortic regurgitation	3.7	
Moderate periprosthetic aortic regurgitation	0.6	
Severe periprosthetic aortic regurgitation	0	
Moderate postrepair mitral regurgitation		0.4
Severe postrepair mitral regurgitation		0
Moderate periprosthetic mitral regurgitation		0
Severe periprosthetic mitral regurgitation		0
Total mortality	1.5	2.2

AMI, acute myocardial infarction; Ao group, aortic valve replacement alone, using a miniaccess; COPD, chronic obstructive pulmonary disease; HT, hypertension; ICU, intensive care unit; MT group, right anterior minithoracotomy for mitral replacement/repair, tricuspid repair, atrial septal defect closure, or atrial myxoma resection Values are expressed as the percentage, mean ± standard deviation, or median [interquartile range].

To conclude, these results indicate that miniaccess surgery is safe in Spain. In the coming years, we may see a significant expansion of this practice, which would benefit many patients, allowing faster return to normal activities of daily life, and with a lower cost expenditure for the publically-funded health care system.

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Sergio Juan Cánovas López,[a,*] Francisco Estevez Cid,[b] Guillermo Reyes Copa,[c] María Jesús López Gude,[d] José María Melero Tejedor,[e] and Sara Badía Gamarra[f]

[a]*Servicio de Cirugía Cardiovascular, Hospital Clínico Universitario Virgen de la Arrixaca, IMIB, El Palmar, Murcia, Spain*
[b]*Servicio de Cirugía Cardiaca, Complejo Hospitalario Universitario A Coruña, A Coruña, Spain*
[c]*Servicio de Cirugía Cardiaca, Hospital Universitario de La Princesa, Madrid, Spain*
[d]*Servicio de Cirugía Cardiaca, Hospital Universitario 12 de Octubre, Madrid, Spain*
[e]*Servicio de Cirugía Cardiaca, Hospital Universitario Virgen de la Victoria, Málaga, Spain*
[f]*Servicio de Cirugía Cardiaca, Hospital Universitari Germans Trias i Pujol, Badalona, Barcelona, Spain*

[*] Corresponding author:
E-mail address: sjcanovas@gmail.com (S.J. Cánovas López).

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Out-of-working-hours Primary Percutaneous Coronary Intervention in STEACS: Does It Worsen Clinical Outcomes?

Intervención coronaria percutánea primaria en el SCACEST fuera del horario laboral. ¿Tiene peores resultados clínicos?

To the Editor,

There are no studies in Spain investigating the outcome of primary percutaneous interventions (PPCIs) for ST-elevation acute coronary syndrome (STEACS) performed out-of-working-hours (OWH) compared with those carried out during working hours (WH).

A retrospective analysis was performed in a cohort of STEACS patients treated by PPCI in our center between 2006 and 2014 (N = 2941). The characteristics of the sample were

Table 1
Baseline and Procedure-Related Characteristics

	PPCI WH (n = 756)	PPCI OWH (n = 2185)	*P*
Cardiovascular risk factors			
Age, y	63.6 (13.03)	62.7 (13.07)	.106
Women	177 (23.4)	453 (20.7)	.123
Hypertension	358 (47.4)	1037 (47.5)	.966
Diabetes mellitus	151 (20.0)	409 (18.7)	.452
Smoker	260 (34.4)	870 (39.8)	.008
Dyslipidemia	304 (40.2)	887 (40.6)	.864
Medical history			
Previous infarction	69 (9.1)	190 (8.7)	.710
Previous PCI	67 (8.9)	187 (8.6)	.822
Coronary surgery	8 (1.1)	20 (0.9)	.670
Stroke/TIA	18 (2.4)	62 (2.8)	.604
COPD	14 (1.9)	46 (2.1)	.766
CrCl	85.9 (37.5)	86.1 (36.1)	.910
Initial Hb	14.1 (2.44)	14.2 (2.65)	.280
Type of STEACS			
Anterior	325 (43.0)	923 (42.2)	.733
Inferior	359 (47.5)	1096 (50.2)	.206
Lateral	43 (5.7)	116 (5.3)	.709
Posterior	13 (1.7)	29 (1.3)	.477
Indeterminate	10 (1.3)	14 (0.6)	.097
Clinical presentation			
Shock at presentation	15 (2.0)	53 (2.4)	.575
PCR at presentation	17 (2.2)	47 (2.2)	.885
SAP, mmHg	121.6 (23.7)	122.4 (23.6)	.452
DAP, mmHg	75.4 (14.2)	75.5 (14.0)	.070
HR, bpm	76.2 (18.5)	76.0 (18.2)	.851
Medical contact			
Medical emergency number-061	153 (20.2)	439 (20.1)	.958
Nonhospital emergency service	286 (37.8)	872 (39.9)	.321
Hospital, no catheterization laboratory	124 (16.5)	449 (20.5)	< .001
Hospital, catheterization laboratory	193 (25.5)	425 (19.5)	< .001
Killip class at admittance			
I	620 (82.0)	1802 (82.5)	.782
II	46 (6.1)	161 (7.4)	.249
III	25 (3.3)	49 (2.2)	.108
IV	65 (8.6)	173 (7.9)	.588
Coronary disease and ventricular function			
Culprit artery			
LMCA	6 (0.8)	16 (0.7)	.810
LAD	333 (44.0)	939 (43.0)	.610
CX	82 (10.8)	268 (12.3)	.328
RC	299 (839.6)	900 (41.2)	.440
Coronary disease			
Multivessel disease	371 (49.1)	1.081 (49.5)	.899
LMCA	30 (4.0)	74 (3.4)	.493
LAD	523 (69.2)	1459 (66.8)	.242
CX	289 (38.2)	913 (41.8)	.094
RC	468 (61.9)	1326 (60.7)	.574
LVEF, %	54.6 (13.0)	54.6 (12.9)	.983
LVEF <35%	72 (10.6)	207 (10.0)	.715
Procedure			
Radial access	646 (85.4)	1894 (86.7)	.390
DES	137 (18.2)	400 (18.3)	1
CS	554 (73.8)	1598 (73.3)	.811
Successful PPCI	719 (95.1)	2081 (95.2)	.921

COPD, chronic obstructive pulmonary disease; CrCl, creatinine clearance; CS, conventional stent; CX, circumflex artery; DAP, diastolic arterial pressure; DES, drug-eluting stent; Hb, hemoglobin; HR, heart rate; LMCA, left main coronary artery; LVEF, left ventricular ejection fraction; LAD, left anterior descending artery; OWH, out-of-working-hours; WH, working hours; PCI, percutaneous coronary intervention; PCR, polymerase chain reaction; PPCI, primary percutaneous coronary intervention; RC, right coronary artery; SAP, systolic arterial pressure; STEACS, ST–segment-elevation acute coronary syndrome; TIA, transient ischemic attack. Unless otherwise indicated, the data are expressed as no. (%).

Table 2
Incidence of Clinical Events

Event	At 30 d			At 1 y			During follow-up (median, 4.06 y)		
	WH (n = 756)	OWH (n = 2185)	*P*	WH (n = 756)	OWH (n = 2185)	*P*	WH (n = 756)	OWH (n = 2185)	*P*
Death	52 (6.9)	121 (5.5)	.179	75 (9.9)	186 (8.5)	.236	106 (14.0)	263 (12.0)	.149
Re-AMI	18 (2.4)	56 (2.6)	.893	33 (4.4)	97 (4.4)	1	43 (5.7)	131 (6.0)	.781
RTV	21 (2.8)	49 (2.2)	.407	44 (5.8)	106 (4.9)	.292	53 (7.0)	141 (6.5)	.551
ST	16 (2.1)	45 (2.1)	.883	18 (2.4)	55 (2.5)	.893	19 (2.5)	65 (3.0)	.530

OWH, out-of-working-hours; WH, working hours; n, number of events; Re-AMI, acute myocardial reinfarction; RTV, revascularization of the treated vessel; ST, stent thrombosis. Unless otherwise indicated, the data are expressed as no. (%).

obtained from the center's electronic database, where patient information is prospectively recorded by the physician performing the procedure. PPCI was established as being OWH when it was performed on weekdays between 3:00 p.m. and 8:00 a.m., on weekends, or on official holidays, whereas WH PPCIs were procedures carried out on weekdays between 8:00 a.m. and 3:00 p.m.

The main event evaluated was death during follow-up. Secondary events were reinfarction, revascularization of the treated vessel, and demonstrated stent thrombosis. The electronic medical records (IANUS software) were exhaustively reviewed to estimate clinical event rates using the Kaplan-Meier method; comparisons were made with the log-rank test. Cox regression analysis was applied to assess the effect of OWH PPCI on mortality adjusted by age, sex, diabetes mellitus, previous acute myocardial infarction, creatinine clearance, hemoglobin, anterior SCACEST, Killip class, left ventricular ejection fraction, multivessel disease, radial access, total ischemia time, and the success of PPCI.

In total, 2185 OWH PPCI (74.3%) were performed. There were no differences between OWH and WH procedures with regard to the patients' clinical or angiographic characteristics, or procedure-related factors (Table 1). PPCI success rates were similar between the 2 groups (OWH 95.2% and WH 95.1%; $P = .921$).

The first medical contact took place more often in a hospital that was not equipped with a catheterization laboratory in the OWH PPCI group (20.5% vs 16.5%; $P < .001$). No differences were found in relation to first contacts through 061 (medical emergency number) or emergency services other than hospital emergency rooms.

There were no significant differences between OWH and WH procedures regarding the time interval between symptom onset and the first medical contact (median, 74 vs 71 minutes; $P = .793$). The time from the first medical contact to artery-opening treatment was significantly longer in OWH PPCI (median, 128 vs 118 minutes; $P < .001$). The total ischemia time was longer in OWH PPCI, but this difference did not reach statistical significance (median, 221 vs 211 minutes; $P = .094$).

After a lengthy follow-up, (median, 1482 [interquartile range, 675-2289] days), there were no differences in mortality or in the other events studied between OWH and WH PPCI (Table 2). OWH PPCI was not associated with a higher adjusted risk of death during follow-up (hazard ratio, 0.92, 95% confidence interval, 0.71-1.19).

Over the last few years, there has been some controversy regarding the relationship between WH and PPCI-related death. Initial reports described higher mortality rates in OWH procedures,[1,2] but this was not seen in more recent studies or in the present series. [3–5] Several explanations have been considered:[4] circadian variations in myocardial perfusion, selection bias, and differences in the populations studied or the health care provided. As seen in other studies,[2–4] the delays to reperfusion were were longer in OWH than WH PPCI, although the added time yielded a modest absolute value, which could explain why there was no impact of this factor on the clinical outcome. These results should be viewed in the setting of a high-volume hospital providing PPCI within a consolidated regional health care network for STEACS patients[6] that offers consistent medical care for infarction in our area, regardless of the time frame. This study has the limitations inherent to a retrospective design based on an unaudited hospital database. In addition, as it did not include patients who were not treated within the publically funded health care system, those who died before PPCI could be performed, and those who could not undergo angioplasty, the series does not necessarily represent the entire population of STEACS patients. Nonetheless, this selection bias is also seen in the other related studies.

Within a network providing care for STEACS patients, OWH PPCI achieves clinical results comparable to those of procedures performed in WH.

Aída Escudero-González, Xacobe Flores-Ríos,*
Cayetana Barbeito-Caamaño, Patricia Pardo-Martínez,
Nicolás Vázquez-González, and José M. Vázquez Rodríguez

Servicio de Cardiología, Complexo Hospitalario Universitario A Coruña, A Coruña, Spain

*Corresponding author:
E-mail address: xacobeflores@yahoo.es (X. Flores-Ríos).

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