of hospital discharge; and 1 conversion to full median sternotomy due to bleeding after the procedure was finished, caused by damage to the pulmonary artery after release of the aortic clamp. The remaining patients' hospital stays were < 5 days, with no postoperative pain and recovery of normal activities in 2 weeks (Figure). Therefore, regarding morbidity and mortality, the results of our series are comparable to those of other published studies.[1,4]

According to the literature, compared with those with conventional treatments, patients who undergo surgery with minimally invasive approaches have fewer arrhythmias, less bleeding and need for transfusion, shorter stays in intensive care and in hospital, earlier extubation, less postoperative pain, and an earlier recovery of functional status and daily activities, with greater patient satisfaction and a better aesthetic result.[1,2] Despite the lower morbidity, these techniques are not performed routinely in all hospitals, as they are more technically demanding for the surgeons, have longer operating times (ischemia time and extracorporeal circulation time), and are accompanied by the corresponding learning curves and need for dedicated, costly materials.[3,4] In the future development of cardiac surgery, minimally invasive surgery has an essential role in responding to the demands of both patients and cardiologists; it is comparable to interventional procedures[5] and an excellent technique for the surgical approach in patients with previous cardiac surgery.[1,2,6] Therefore, in various hospitals, minimally invasive surgery appears to be an increasingly popular technique as an alternative to conventional surgery. Prospective, randomized studies are needed to allow a better evaluation of the clinical outcomes and cost-efficiency of this technique.

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One-year Non-persistence With Contemporary Antiplatelet Therapy in Acute Coronary Syndrome Patients Undergoing Percutaneous Coronary Intervention

Falta de persistencia con el tratamiento antiplaquetario contemporáneo al año en pacientes con síndrome coronario agudo sometidos a intervención coronaria percutánea

To the Editor,

In patients with acute coronary syndrome (ACS) undergoing percutaneous coronary intervention (PCI), nonpersistence with antiplatelet therapy prescribed at discharge may lead to worse outcomes.[1] Apart from treatment cessation, nonpersistence may take the form of switching from one agent to another, which is common in everyday clinical practice.[2] We present insights from the GReek AntiPlatelet rEgistry (GRAPE) on 1-year nonpersistence with treatment prescribed at discharge.

GRAPE is a prospective, observational, multicenter, cohort study involving consecutive, moderate-to-high risk ACS patients undergoing PCI. Initial $P2Y_{12}$ receptor antagonist selection along with the subsequent in-hospital and postdischarge antiplatelet agent administration were left to the discretion of the treating clinician. Follow-up was performed at 1, 6, and 12 months by telephone interview or personal contact. Persistence with $P2Y_{12}$ receptor antagonists was defined as conforming to the recommendation of continuing the same $P2Y_{12}$ receptor antagonist as that prescribed at discharge. Switching was defined as changing to a different $P2Y_{12}$ receptor antagonist than that prescribed at discharge, and cessation as not receiving any $P2Y_{12}$ receptor antagonist.

To assess potential predictive factors for cessation and switching, we used logistic regression modelling and adjusted for type of $P2Y_{12}$ receptor antagonist, oral anticoagulant, male sex, age (in decades), body mass index (per 5 Kg/m^2), diabetes mellitus, hypertension, smoking, reason for admission, prior bleeding, creatinine clearance (calculated by the Cockroft-Gault formula) < 60 mL/min, and PCI without stenting or with only bare metal stent use. The model was tested for discriminative power by the C-statistic. Informed consent was obtained from each patient and the protocol was approved by each institution's human research committee. GRAPE has been registered at clinical trials (NCT01774955).

At 1 year, 101 (5%) patients were lost to follow-up, while data on $P2Y_{12}$ receptor antagonist medication at 1 year were analyzable in 2005 patients. The nonpersistence rate was 24.2% (485 of 2005), with 55.5% (269 of 485) of nonpersistant patients having switched to a different $P2Y_{12}$ receptor antagonist, while 44.5% (216 of 485) had discontinuated the $P2Y_{12}$ receptor antagonist. The nonpersistence rate was higher for prasugrel (21.5%) and ticagrelor (37.3%) than for clopidogrel (13.3%), $P <$ .001 for both, and was higher for ticagrelor than for prasugrel, $P <$ .001. Differences were mainly driven by the higher rate of switching among patients discharged under novel $P2Y_{12}$ receptor antagonists (2.5%, 13.2%, and 25.0% for clopidogrel, prasugrel, and ticagrelor, respectively), while the cessation rate did not differ among groups (10.9%, 8.3%, and 12.3% for clopidogrel, prasugrel, and ticagrelor, respectively). Out of 269 patients in the switching group, 191 (71.0%) switched from a

Table
Patients' Demographic and Clinical Characteristics According to Persistence With Discharge $P2Y_{12}$ Receptor Antagonist at 1 Year

	Persistence, n = 1520	Cessation, n = 216	Switching, n = 269	*P*
Male sex	1255 (82.6)	178 (82.4)	220 (81.8)	.9
Age, y	61.6 ± 12.4	63.8 ± 12.1	61.4 ± 10.8	.04
BMI	28.1 ± 4.2	27.9 ± 4.1	28.4 ± 4.1	.4
Medical history				
Hyperlipidemia	704 (46.3)	102 (47.2)	132 (49.1)	.7
Hypertension	792 (52.1)	139 (64.4)	167 (62.1)	<.001
Diabetes mellitus	326 (21.4)	58 (26.9)	71 (26.4)	.06
Smoking	872 (57.4)	105 (48.6)	150 (55.8)	.05
FHCAD	389 (25.6)	48 (22.2)	79 (29.4)	.2
Prior MI	177 (11.6)	27 (12.5)	40 (14.9)	.3
Prior PCI	177 (11.6)	28 (13.0)	35 (13.0)	.7
Prior CABG	45 (3.0)	11 (5.1)	5 (1.9)	.1
Prior stroke	53 (3.5)	10 (4.6)	9 (3.3)	.7
Prior bleeding	135 (8.9)	18 (8.3)	34 (12.6)	.1
Reason of admission				.003
STEMI	837 (55.1)	112 (51.9)	122 (45.4)	
NSTEMI	375 (24.7)	44 (20.4)	74 (27.5)	
UA	308 (20.3)	60 (27.8)	73 (27.1)	
Radial access	258 (17.0)	48 (22.2)	57 (21.2)	.06
Type of stent				<.001
DES	1333 (87.7)	161 (74.5)	238 (88.5)	
BMS	158 (10.4)	46 (21.3)	25 (9.3)	
Both	18 (1.2)	5 (2.3)	2 (0.7)	
None	11 (0.7)	4 (1.9)	4 (1.5)	
In-hospital laboratory evaluation				
Hematocrit, %	41.5 ± 4.5	41.0 ± 4.8	41.5 ± 4.7	.3
CrCl, mL/min	94.9 ± 35.7	90.5 ± 36.3	93.4 ± 32.4	.2
CrCl < 60 mL/min	239 (15.7)	43 (19.9)	40 (14.9)	.3
Medication at discharge				
Aspirin	1507 (99.1)	215 (99.5)	269 (100.0)	.3
Clopidogrel	670 (44.1)	84 (38.9)	19 (7.1)	<.001
Prasugrel	386 (25.4)	41 (19.0)	65 (24.2)	.1
Ticagrelor	464 (30.5)	91 (42.1)	185 (68.8)	<.001
Oral anticoagulant	60 (3.9)	20 (9.3)	5 (1.9)	<.001
Geographic region				<.001
Western Greece	693 (45.6)	86 (39.8)	142 (52.8)	
Epirus	219 (14.4)	42 (19.4)	16 (5.9)	
Thessaly/East Macedonia/Thrace	225 (14.8)	29 (13.4)	39 (14.5)	
Crete	82 (5.4)	8 (3.7)	11 (4.1)	
Attica	301 (19.8)	51 (23.6)	61 (22.7)	

BMI, body mass index; BMS, bare metal stent; CABG, coronary artery bypass grafting; CrCl, creatinine clearance; DES, drug-eluting stent; FHCAD, family history of coronary artery disease; MI, myocardial infarction; NSTEMI, non–ST-elevation acute myocardial infarction; PCI, percutaneous coronary intervention; STEMI, ST-segment elevation myocardial infarction; UA, unstable angina.
Values are expressed no. (%) or mean ± standard deviation.

novel agent (prasugrel or ticagrelor) to clopidogrel, 19 (7.1%) switched from clopidogrel to a novel agent, and 59 (21.9%) switched between novel agents. Patients' demographic and clinical characteristics are shown in Table. Multivariate predictive models for cessation and switching (Figure) demonstrated fair discriminative power (C-statistic = 0.64; 95% confidencie interval [95%CI], 0.59-0.68; $P < .001$ and C-statistic = 0.77; 95%CI, 0.74-0.79; $P < .001$, respectively). Reasons for nonpersistence and 1 year outcomes are provided in the supplementary material.

In GRAPE, at 1 year, differential switching from discharge medication rate was observed among the 3 $P2Y_{12}$ receptor antagonists, being lowest for clopidogrel. Most importantly, to our knowledge, this report describes for the first time that patients prescribed ticagrelor demonstrate the worst behavior concerning persistence with discharge $P2Y_{12}$ receptor antagonist, which is driven mainly by the high switching rate. Ticagrelor is the $P2Y_{12}$ receptor antagonist most recently introduced into clinical practice and is the least well studied outside the setting of clinical trials,